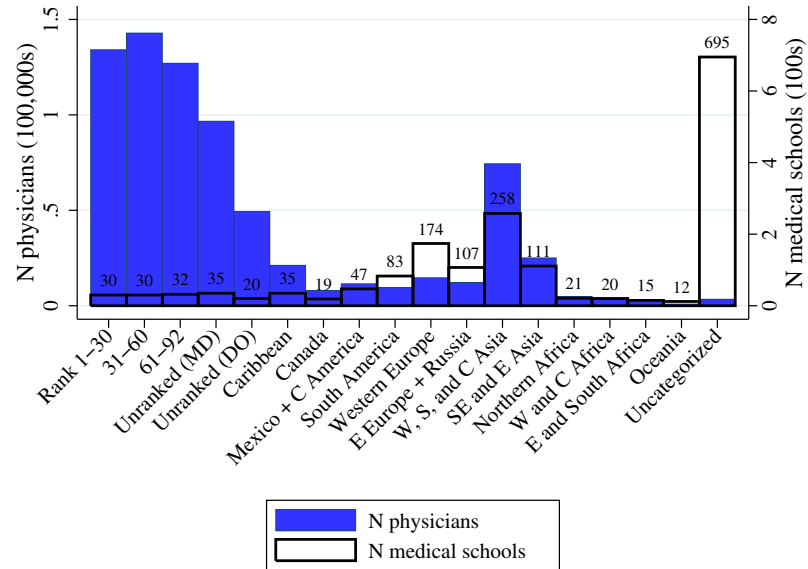# Online Appendix

Addressing the Opioid Epidemic: Is There a Role for Physician Education?

Schnell and Currie (2018)

A Supplementary Figures

Figure A1: Number of Physicians and Medical Schools Across Rankings and World Regions

Notes: Rankings for the top 92 US schools are defined as in Section II. US medical schools that are not ranked are divided by whether they grant the degree of DO or MD. Foreign medical schools are grouped according to the UN's classification of countries by world regions. For foreign medical schools with 10 or more opioid prescribers in our main sample, we googled the medical school and recorded the country of the school's primary campus. For foreign medical schools with fewer than 10 opioid prescribers in our main sample, we assign the medical school to the "Uncategorized" group.

Figure A2: Persistence Across Medical School Rankings Over Time
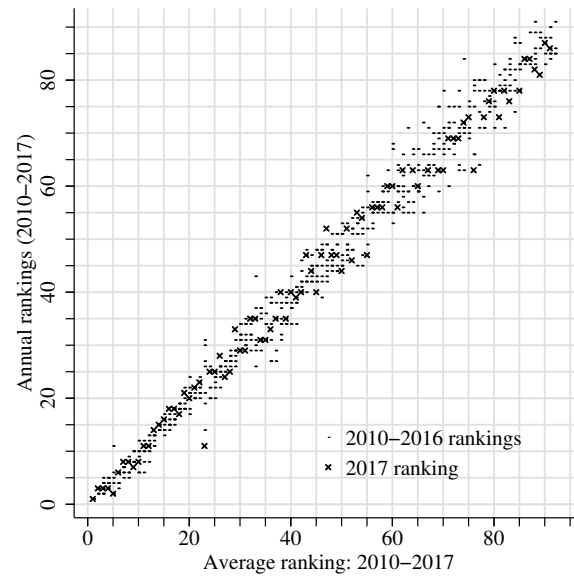

Notes: The above figure depicts how our composite ranking compares to annual rankings from 2010 to 2017. For each composite rank on the x-axis, there are up to eight observations denoting the corresponding medical school's rank in each year between 2010 and 2017. Annual rankings from 2010-2016 are denoted by a point; the most recent ratings (2017) are denoted by a cross.

Figure A3: Opioid Prescriptions by Medical School Rank: All Physicians
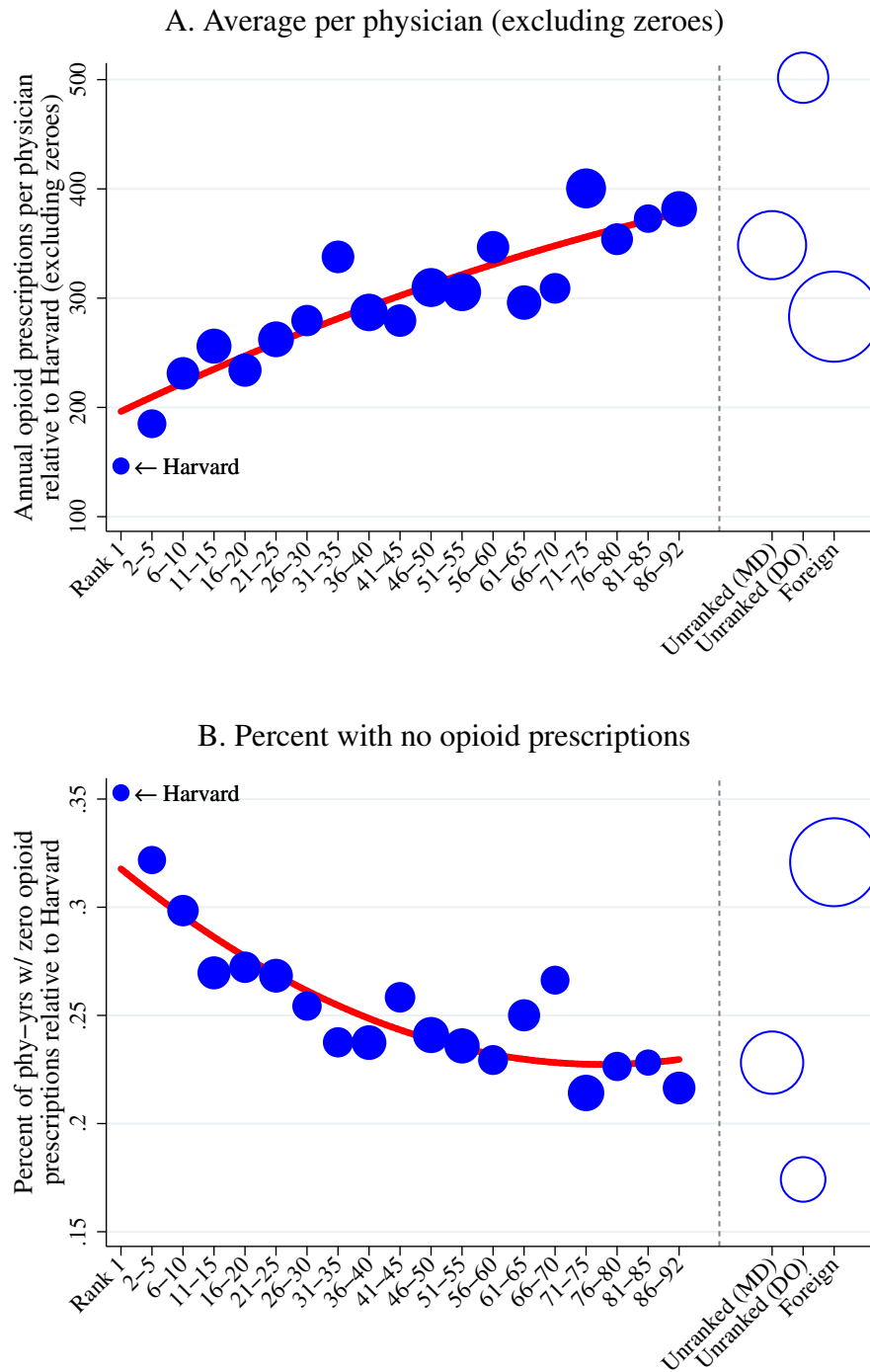
A. Average per physician (excluding zeroes)

B. Percent with no opioid prescriptions

Notes: The above figures depict the average number of opioid prescriptions written yearly per physician conditional on writing at least one opioid prescription (Subfigure A) and the percent of physician-year observations with zero opioid prescriptions (Subfigure B) by medical school rank. All physicians are included; Figure A4 in this appendix provides an analogous figure for GPs only. The size of the marker indicates the number of physician-year observations in a given bin. Refer to Table A4 in this appendix for the underlying averages.

Figure A4: Opioid Prescriptions by Medical School Rank: General Practitioners
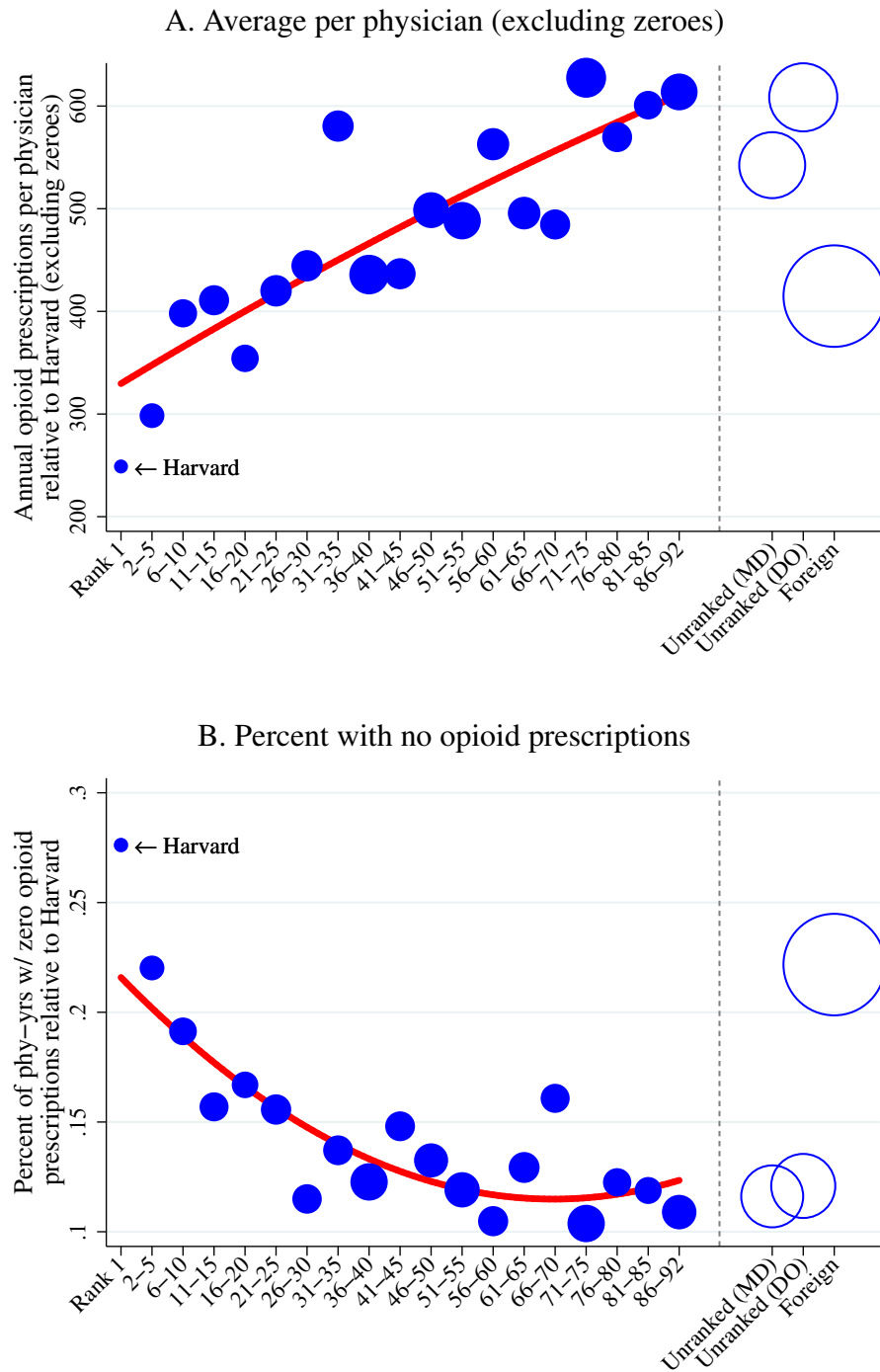
A. Average per physician (excluding zeroes)

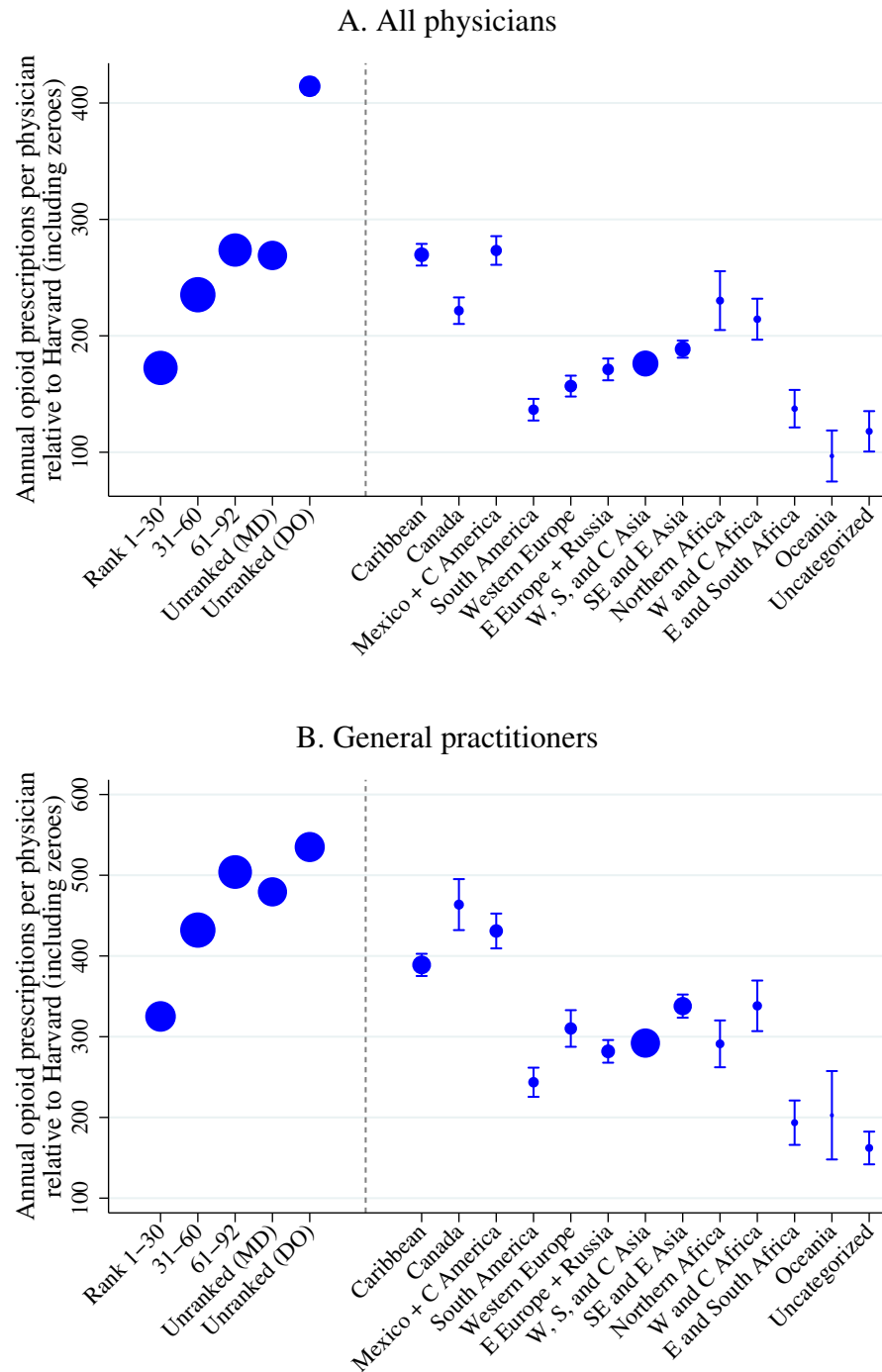### B. Percent with no opioid prescriptions

Notes: The above figures depict the average number of opioid prescriptions written yearly per physician conditional on writing at least one opioid prescription (Subfigure A) and the percent of physician-year observations with zero opioid prescriptions (Subfigure B) by medical school rank. Only GPs are included (physicians in general practice, family practice, and internal medicine); Figure A3 in this appendix provides an analogous figure for all physicians. The size of the marker indicates the number of physician-year observations in a given bin. Refer to Table A5 in this appendix for the underlying averages.

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Figure A5: Opioid Prescriptions by US Rankings and Regions of Foreign Schools

A. All physicians

B. General practitioners

Notes: The above figures depict the average number of opioid prescriptions written yearly per physician by medical school rank for US-trained physicians and region of training for foreign-trained physicians. Subfigure A includes all physicians; Subfigure B only includes GPs (physicians in general practice, family practice, and internal medicine). Physician-years with zero opioid prescriptions are included. The size of the marker indicates the number of physician-year observations in a given bin; confidence intervals not displayed are covered by the marker. Refer to Tables A4 and A5 in this appendix for the underlying averages for all physicians and GPs, respectively.

Figure A6: Opioid Prescriptions by Medical School Rank: Oncology and Nephrology
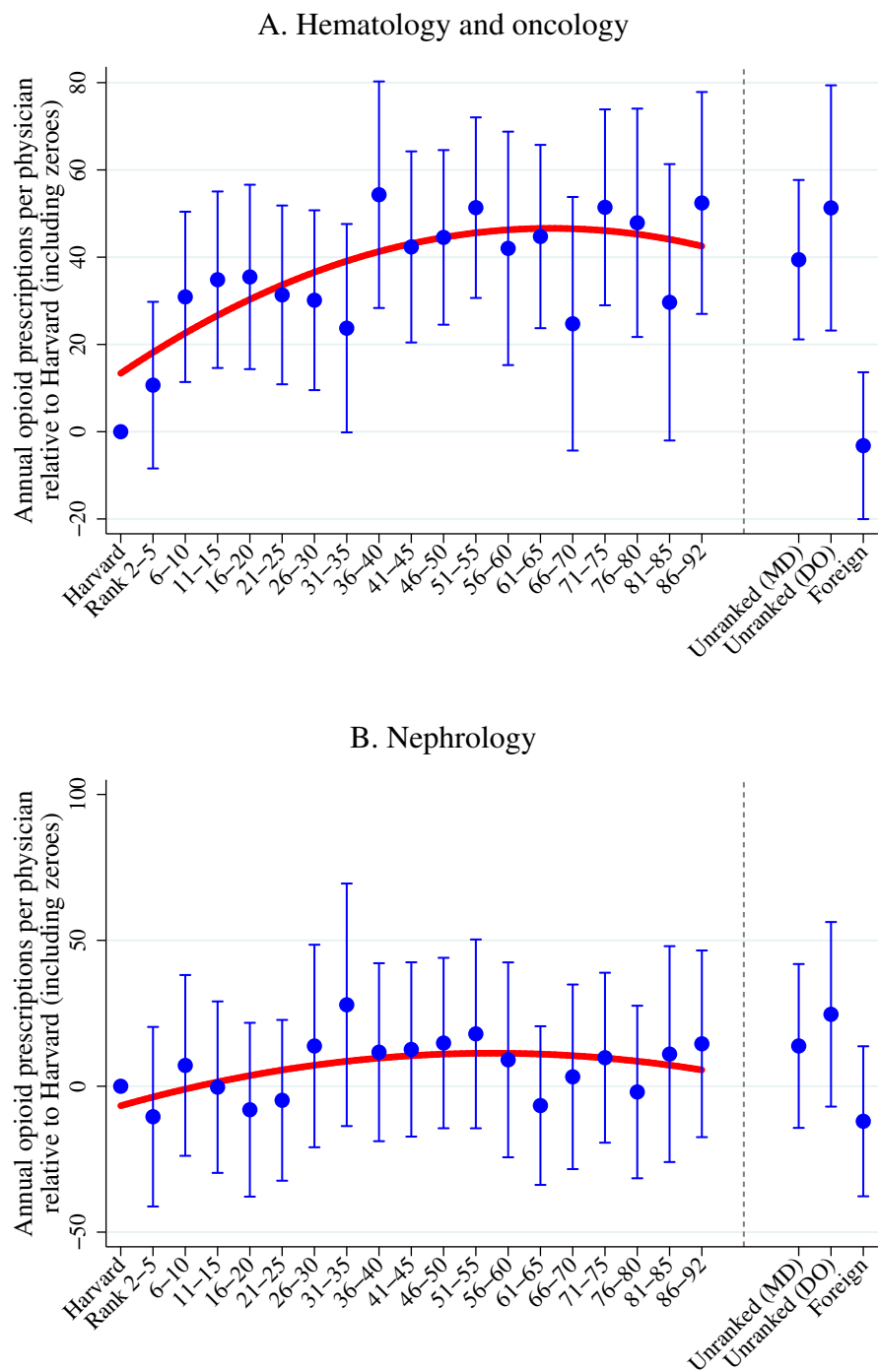
A. Hematology and oncology

B. Nephrology

Notes: The above figures depict the coefficient estimates on indicators for medical school rank bins from regressions of opioid prescriptions at the physician-year level on medical school rank bin indicators with year and county fixed effects (variants of Equation (1)). Subfigure A includes physicians in hematology or oncology; Subfigure B includes physicians in nephrology. Physician-years with zero opioid prescriptions are included. The bars denote 95% confidence intervals; standard errors are clustered by physician.

Figure A7: Opioid Prescriptions by Medical School Rank Across Graduation Cohorts

A. All physicians
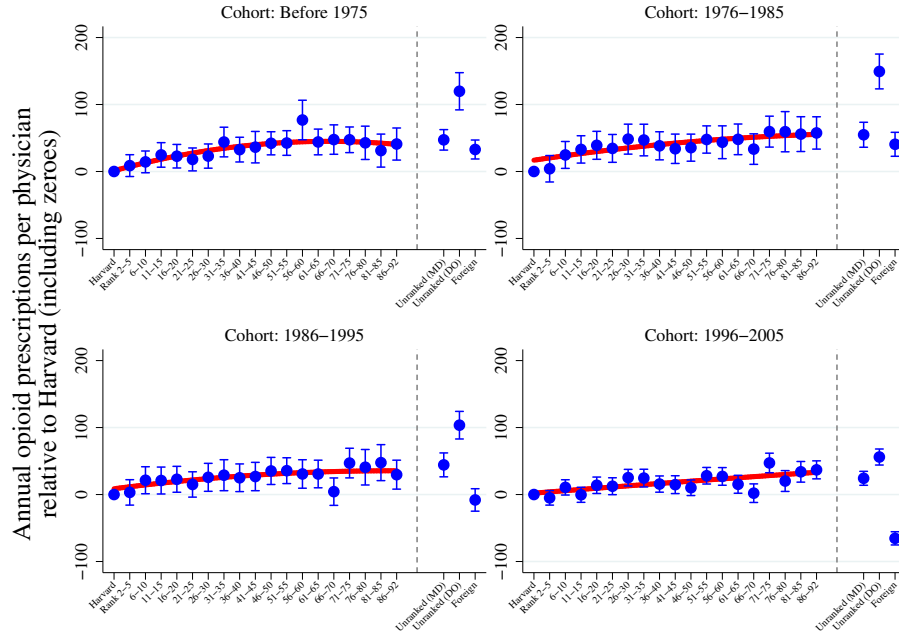
B. General practitioners

Notes: The above figures depict the coefficient estimates on indicators for medical school rank bins from regressions of opioid prescriptions at the physician-year level on medical school rank bin indicators with year, specialty, and county fixed effects (Equation (1)). Subfigure A includes all physicians; Subfigure B only includes GPs (physicians in general practice, family practice, and internal medicine). Physician-years with zero opioid prescriptions are included. The bars denote 95% confidence intervals; standard errors are clustered by physician.

Figure A8: Opioid Prescriptions by Medical School Rank Excluding University-Affiliated Zip Codes

A. All physicians
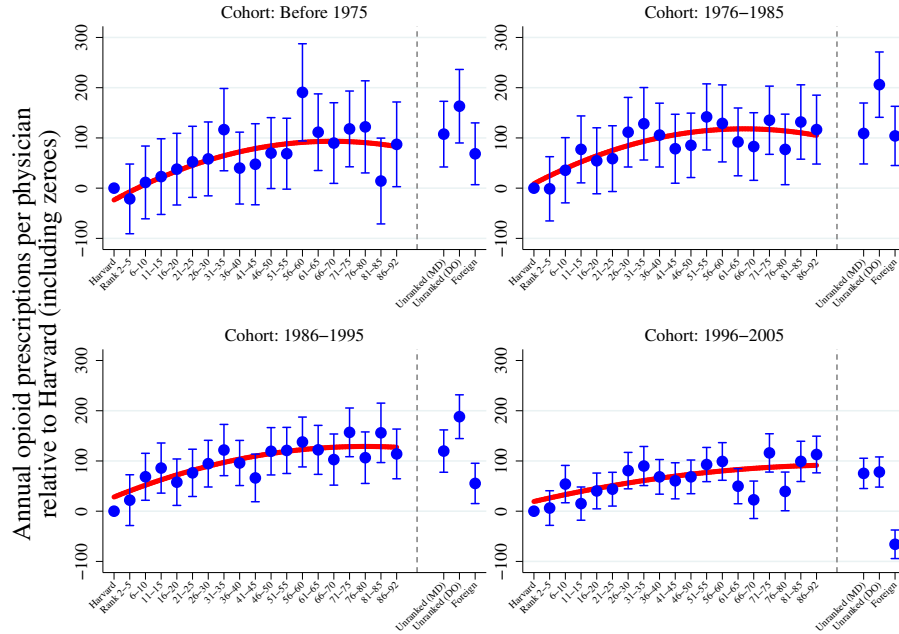

B. General practitioners

Notes: The above figures depict the coefficient estimates on indicators for medical school rank bins from regressions of opioid prescriptions at the physician-year level on medical school rank bin indicators with year, specialty, and county fixed effects (Equation (1)). Physicians whose practice address is in a zip code with a university-affiliated hospital are excluded. Physician-years with zero opioid prescriptions are included. The bars denote 95% confidence intervals; standard errors are clustered by physician.

Figure A9: Opioid Prescriptions by Medical School Rank Controlling for Specialty and Practice Address
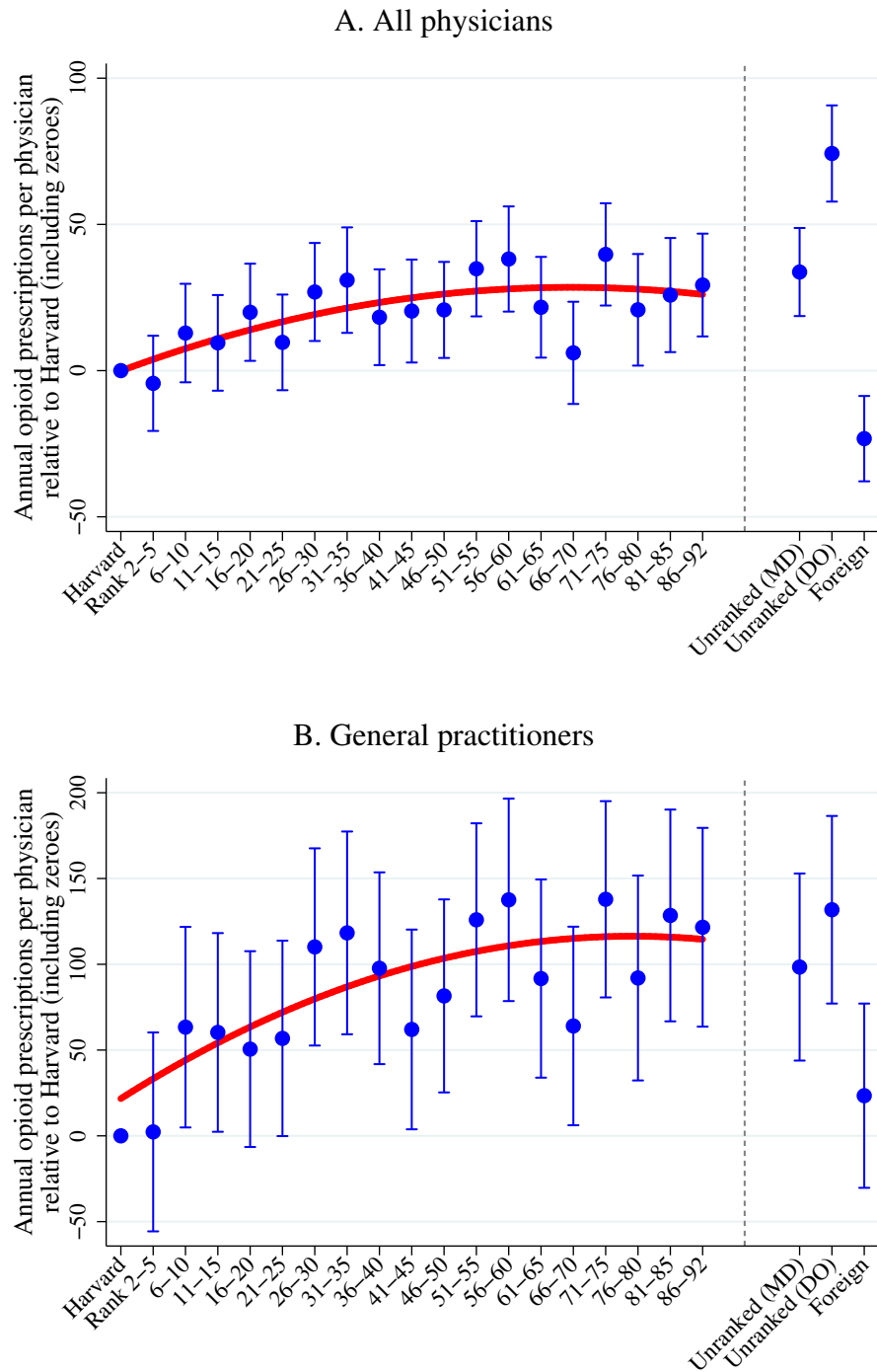
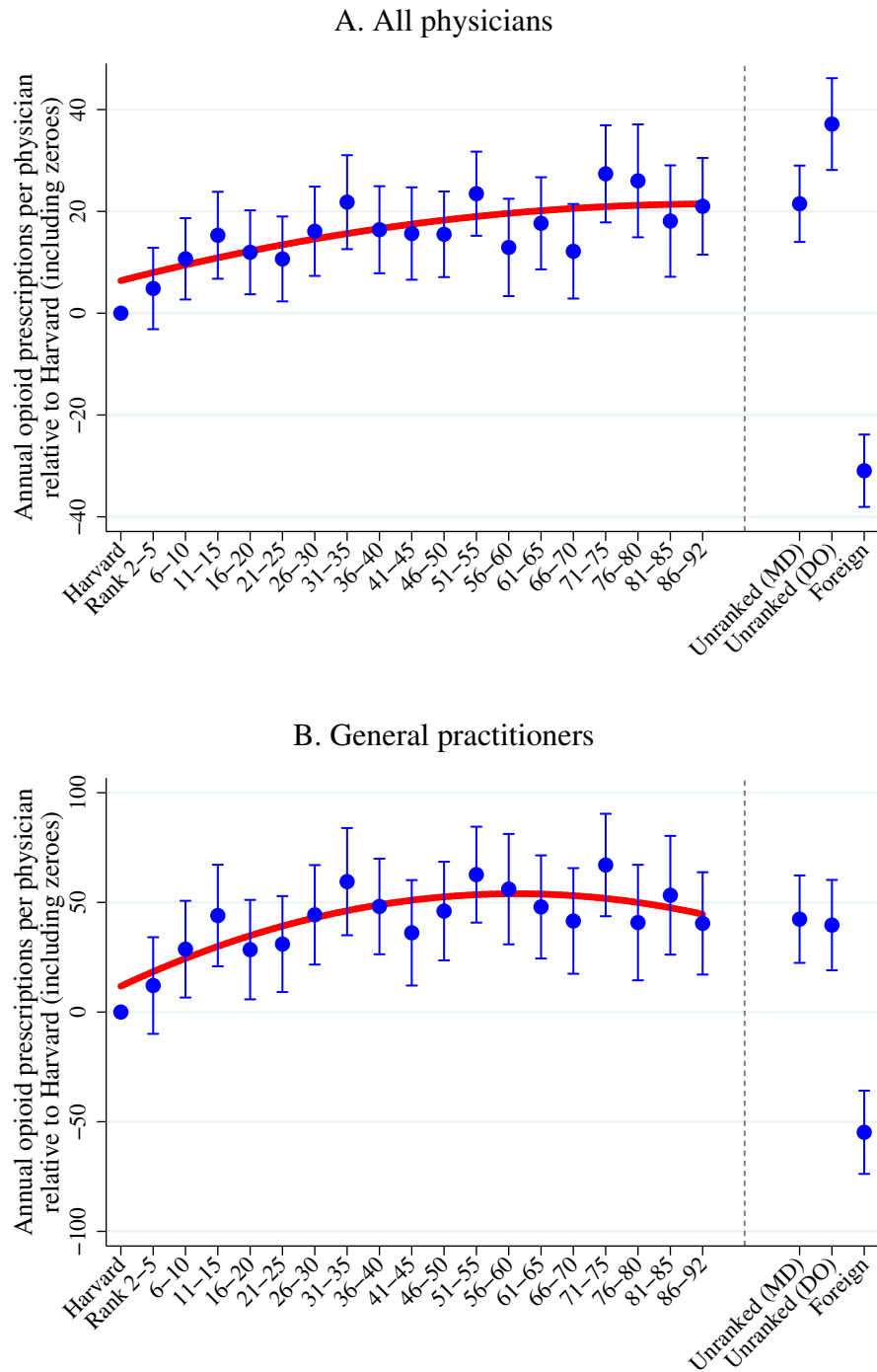## A. All physicians

B. General practitioners

Notes: The above figures depict the coefficient estimates on indicators for medical school rank bins from regressions of opioid prescriptions at the physician-year level on medical school rank bin indicators with year, specialty, and practice address fixed effects (variants of Equation (1)). Subfigure A includes all physicians; Subfigure B only includes GPs (physicians in general practice, family practice, and internal medicine). Physician-years with zero opioid prescriptions are included. The bars denote 95% confidence intervals; standard errors are clustered by physician.

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B Supplementary Tables

Table A1: Composite Medical School Rankings

1 HARVARD MEDICAL SCHOOL	47 WAKE FOREST SCHOOL OF MEDICINE
2 JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE	48 INDIANA UNIVERSITY SCHOOL OF MEDICINE
3 PERELMAN SCHOOL OF MEDICINE AT UPENN	49 TUFTS UNIVERSITY SCHOOL OF MEDICINE
4 UCSF SCHOOL OF MEDICINE	50 UNIVERSITY OF MIAMI MILLER SCHOOL OF MEDICINE
5 STANFORD UNIVERSITY SCHOOL OF MEDICINE	51 UNIVERSITY OF MASSACHUSETTS MEDICAL SCHOOL
6 WASH U IN ST LOUIS SCHOOL OF MEDICINE	52 UNIVERSITY OF UTAH SCHOOL OF MEDICINE
7 YALE UNIVERSITY SCHOOL OF MEDICINE	53 MEDICAL COLLEGE OF WISCONSIN
8 DUKE UNIVERSITY SCHOOL OF MEDICINE	54 TEMPLE UNIVERSITY SCHOOL OF MEDICINE
9 COLUMBIA U COLLEGE OF PHYSICIANS AND SURGEONS	55 UNIVERSITY OF ILLINOIS AT CHICAGO COLLEGE OF MEDICINE
10 UNIVERSITY OF WASHINGTON SCHOOL OF MEDICINE	56 UNIVERSITY OF TEXAS MEDICAL SCHOOL AT HOUSTON
11 UNIVERSITY OF MICHIGAN MEDICAL SCHOOL	57 SCHOOL OF MEDICINE AT STONY BROOK UNIVERSITY
12 UCHICAGO PRITZKER SCHOOL OF MEDICINE	58 UNIVERSITY OF VERMONT COLLEGE OF MEDICINE
13 DAVID GEFFEN SCHOOL OF MEDICINE AT UCLA	59 MEDICAL UNIVERSITY OF SOUTH CAROLINA
14 VANDERBILT UNIVERSITY SCHOOL OF MEDICINE	60 UT SCHOOL OF MEDICINE AT SAN ANTONIO
15 UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE	61 SIDNEY KIMMEL MEDICAL COLLEGE AT THOMAS JEFFERSON U
16 UCSD SCHOOL OF MEDICINE	62 UNIVERSITY OF CONNECTICUT SCHOOL OF MEDICINE
17 WEILL CORNELL MEDICAL COLLEGE	63 UNIVERSITY AT BUFFALO SCHOOL OF MEDICINE
18 NORTHWESTERN UNIVERSITY	64 GEORGE WASHINGTON UNIVERSITY SCHOOL OF MEDICINE
19 ICHAN SCHOOL OF MEDICINE AT MOUNT SINAI	65 UNIVERSITY OF KENTUCKY COLLEGE OF MEDICINE
20 BAYLOR COLLEGE OF MEDICINE	66 UNIFORMED SERVICES F E HEBERT SCHOOL OF MEDICINE
21 UNC AT CHAPEL HILL SCHOOL OF MEDICINE	67 UNIVERSITY OF NEBRASKA COLLEGE OF MEDICINE
22 EMORY UNIVERSITY SCHOOL OF MEDICINE	68 RUSH MEDICAL COLLEGE OF RUSH UNIVERSITY
23 NEW YORK UNIVERSITY SCHOOL OF MEDICINE	69 ST LOUIS UNIVERSITY SCHOOL OF MEDICINE
24 UT SOUTHWESTERN MEDICAL SCHOOL	70 UNIVERSITY OF ARIZONA COLLEGE OF MEDICINE
25 CASE WESTERN UNIVERSITY SCHOOL OF MEDICINE	71 UNIVERSITY OF KANSAS SCHOOL OF MEDICINE
26 UNIVERSITY OF VIRGINIA SCHOOL OF MEDICINE	72 VIRGINIA COMMONWEALTH U SCHOOL OF MEDICINE
27 MAYO MEDICAL SCHOOL	73 WAYNE STATE UNIVERSITY SCHOOL OF MEDICINE
28 UNIVERSITY OF WISCONSIN SCHOOL OF MEDICINE	74 UNIVERSITY OF OKLAHOMA COLLEGE OF MEDICINE
29 UNIVERSITY OF IOWA	75 MEDICAL COLLEGE OF GEORGIA AT GEORGIA REGENTS U
30 UNIVERSITY OF ROCHESTER SCHOOL OF MEDICINE	76 U OF SOUTH FLORIDA HEALTH MORSANI COLLEGE OF MEDICINE
31 BOSTON UNIVERSITY SCHOOL OF MEDICINE	77 RUTGERS ROBERT WOOD JOHNSON MEDICAL SCHOOL
32 WARREN ALPERT MEDICAL SCHOOL OF BROWN	78 RUTGERS NEW JERSEY MEDICAL SCHOOL
33 UNIVERSITY OF ALABAMA SCHOOL OF MEDICINE	79 UNIVERSITY OF MISSOURI COLUMBIA SCHOOL OF MEDICINE
34 OREGON HEALTH & SCIENCE UNIVERSITY	80 UNIVERSITY OF LOUISVILLE SCHOOL OF MEDICINE
35 KECK SCHOOL OF MEDICINE OF THE USC	81 UNIVERSITY OF TENNESSEE COLLEGE OF MEDICINE
36 OHIO STATE UNIVERSITY COLLEGE OF MEDICINE	82 CREIGHTON UNIVERSITY SCHOOL OF MEDICINE
37 UNIVERSITY OF COLORADO SCHOOL OF MEDICINE	83 TEXAS A&M UNIVERSITY COLLEGE OF MEDICINE
38 GEISEL SCHOOL OF MEDICINE AT DARTMOUTH	84 UNIVERSITY OF HAWAII AT MANOA
39 UNIVERSITY OF MINNESOTA MEDICAL SCHOOL	85 UNIVERSITY OF NEW MEXICO SCHOOL OF MEDICINE
40 UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE	86 UNIVERSITY OF ARKANSAS COLLEGE OF MEDICINE
41 ALBERT EINSTEIN COLLEGE OF MEDICINE OF YESHIVA U	87 TEXAS TECH UNIVERSITY SCHOOL OF MEDICINE
42 UNIVERSITY OF CINCINNATI COLLEGE OF MEDICINE	88 DREXEL UNIVERSITY COLLEGE OF MEDICINE
43 UC DAVIS SCHOOL OF MEDICINE	89 UNIVERSITY OF NEVADA SCHOOL OF MEDICINE
44 UC IRVINE COLLEGE OF MEDICINE	90 MICHIGAN STATE UNIVERSITY COLLEGE OF HUMAN MEDICINE
45 UNIVERSITY OF FLORIDA COLLEGE OF MEDICINE	91 WEST VIRGINIA UNIVERSITY SCHOOL OF MEDICINE
46 GEORGETOWN UNIVERSITY SCHOOL OF MEDICINE	92 UNIVERSITY OF SOUTH CAROLINA SCHOOL OF MEDICINE

Notes: The above table lists the composite rankings used for ranked US medical schools. Refer to Section II for a detailed overview of how these rankings are constructed.

Table A2: Summary Statistics: Prescription Data

	By year									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	*All*
Total opioids dispensed (100 million)	2.04	2.14	2.21	2.50	2.57	2.58	2.60	2.52	2.44	21.60
Panel A: All physicians										
N physicians	742,297	742,297	742,297	742,297	742,297	742,297	742,297	742,297	742,297	742,297
N physician-years	.	.	.	.	.	.	.	.	.	6,680,673
Opioids prescribed (100 million)	1.52	1.60	1.66	1.89	1.92	1.90	1.87	1.75	1.65	15.74
% of total dispensed	74.5	74.9	75.0	75.4	74.7	73.6	71.6	69.5	67.3	72.9
Average per physician-year	204.9	215.8	223.1	254.1	258.5	255.7	251.4	235.8	221.7	235.7
including zeroes	(1.2)	(1.3)	(1.4)	(1.6)	(1.6)	(1.7)	(1.6)	(1.6)	(1.5)	(1.4)
Average per physician-year	287.1	298.7	303.7	337.1	342.0	339.7	331.4	318.7	309.0	319.0
excluding zeroes	(1.7)	(1.8)	(1.8)	(2.0)	(2.1)	(2.1)	(2.1)	(2.1)	(2.1)	(1.8)
Zeroes (% physician-years)	28.6	27.7	26.5	24.6	24.4	24.7	24.2	26.0	28.3	26.1
Panel B: General practitioners										
N physicians	203,576	203,576	203,576	203,576	203,576	203,576	203,576	203,576	203,576	203,576
N physician-years	.	.	.	.	.	.	.	.	.	1,832,184
Opioids prescribed (100 million)	0.70	0.74	0.77	0.91	0.93	0.92	0.92	0.87	0.82	7.59
% of total dispensed	34.2	34.7	35.0	36.5	36.3	35.8	35.2	34.5	33.5	35.1
Average per physician-year	342.7	364.5	379.9	448.8	458.1	453.0	450.8	427.0	402.4	414.1
including zeroes	(2.8)	(3.0)	(3.1)	(3.5)	(3.6)	(3.5)	(3.5)	(3.3)	(3.2)	(2.9)
Average per physician-year	426.1	446.7	456.3	526.1	534.5	527.8	522.3	501.3	480.3	492.1
excluding zeroes	(3.3)	(3.5)	(3.6)	(3.9)	(4.0)	(4.0)	(3.9)	(3.8)	(3.7)	(3.3)
Zeroes (% physician-years)	19.6	18.4	16.7	14.7	14.3	14.2	13.7	14.8	16.2	15.8

Notes: Standard errors are displayed in parentheses and are clustered by physician. The top row displays the total number of opioids dispensed as reported in the QuintilesIMS data. The next two panels provide summary statistics for our cleaned sample of physicians (Panel A) and GPs (Panel B; physicians in general practice, family practice, and internal medicine). The prescription statistics are raw averages; that is, they do not control for physician specialty or county of practice.

Table A3: Summary Statistics: County-Level Prescriptions and Mortality

	By year									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	*All*
N counties	3,140	3,140	3,140	3,140	3,140	3,140	3,140	3,140	3,140	3,140
N county-years	.	.	.	.	.	.	.	.	.	28,260
Unweighted averages										
Opioid prescriptions/ capita	0.53	0.55	0.56	0.65	0.65	0.65	0.67	0.66	0.64	0.62
Total deaths/100,000	1008.1	1004.8	1024.6	1002.3	1000.0	1015.6	1024.8	1040.0	1050.9	1019.0
Deaths involving drugs/100,000	12.9	13.7	14.0	14.4	14.7	16.0	15.8	16.7	17.4	15.1
Population-weighted averages										
Opioid prescriptions/ capita	0.64	0.67	0.69	0.77	0.79	0.79	0.79	0.76	0.73	0.74
Total deaths/100,000	813.3	804.8	813.1	794.6	797.9	806.9	809.6	820.7	823.6	809.5
Deaths involving drugs/100,000	14.9	15.2	15.1	15.1	15.5	16.7	16.6	17.5	18.6	16.2

Notes: "Deaths involving drugs" include poisonings from drugs resulting in death as well as deaths in which drug dependence was indicated on the death certificate.

Table A4: Opioid Prescriptions by Medical School Rank

	Unique physicians	Total (in millions)	Opioid prescriptions				
			Including zeroes		Excluding zeroes		
			Average per phy-yr	95% CI of average	Average per phy-yr	95% CI of average	Zeroes (% phys-yrs)
A. US trained							
Ranked							
1 (Harvard)	5,762	4.9	94.7	(88, 102)	146.4	(136, 157)	35.3
2-5	17,155	19.4	125.5	(120, 131)	185.1	(178, 192)	32.2
6-10	21,602	31.5	162.2	(156, 168)	231.2	(223, 239)	29.8
11-15	24,031	40.4	187.0	(181, 193)	256.1	(248, 264)	27.0
16-20	21,589	33.1	170.4	(164, 177)	234.1	(226, 242)	27.2
21-25	25,246	43.6	191.9	(186, 198)	262.3	(254, 270)	26.8
26-30	18,734	35.1	208.4	(202, 215)	279.5	(271, 288)	25.4
31-35	19,919	46.2	257.5	(249, 266)	337.8	(327, 349)	23.8
36-40	26,607	52.4	218.8	(213, 225)	286.9	(279, 295)	23.7
41-45	20,308	37.9	207.3	(199, 215)	279.5	(269, 290)	25.8
46-50	29,076	61.5	235.1	(229, 241)	309.7	(302, 318)	24.1
51-55	27,519	57.8	233.5	(227, 240)	305.6	(298, 313)	23.6
56-60	19,393	46.6	267.1	(259, 276)	346.6	(336, 357)	22.9
61-65	22,628	45.2	222.0	(214, 229)	296.0	(286, 306)	25.0
66-70	18,054	36.8	226.7	(219, 234)	309.0	(299, 319)	26.6
71-75	29,563	83.7	314.7	(307, 323)	400.4	(391, 410)	21.4
76-80	18,561	45.7	273.8	(263, 285)	354.0	(340, 368)	22.6
81-85	14,668	38.0	287.7	(277, 298)	372.8	(360, 386)	22.8
86-92	23,533	63.3	299.0	(291, 307)	381.6	(371, 392)	21.6
Unranked							
US (MD)	96,644	234.0	269.0	(265, 273)	348.6	(343, 354)	22.8
US (DO)	49,376	184.1	414.3	(407, 422)	501.7	(493, 510)	17.4
US total	549,968	1241.5	250.8	(249, 252)	330.2	(328, 332)	24.0
B. Foreign trained							
Caribbean	21,154	51.3	269.7	(260, 279)	363.7	(352, 376)	25.9
Canada	7,931	15.8	221.6	(210, 233)	324.7	(309, 341)	31.8
Mexico + C America	11,502	28.3	273.3	(261, 286)	357.4	(342, 373)	23.5
South America	9,501	11.7	136.6	(127, 146)	214.3	(200, 228)	36.3
Western Europe	14,673	20.7	156.8	(148, 166)	242.2	(229, 256)	35.2
E Europe + Russia	12,185	18.8	171.1	(162, 180)	256.4	(243, 270)	33.2
W, S, and C Asia	74,392	118.0	176.2	(172, 180)	257.8	(252, 264)	31.7
SE and E Asia	25,053	42.5	188.6	(181, 196)	291.1	(280, 302)	35.2
Northern Africa	4,843	10.0	230.2	(205, 255)	344.1	(307, 381)	33.1
W and C Africa	4,177	8.1	214.3	(197, 232)	313.7	(289, 339)	31.7
E and South Africa	2,671	3.3	137.4	(121, 154)	215.0	(191, 239)	36.1
Oceania	863	0.8	96.8	(75, 119)	178.0	(139, 217)	45.6
Uncategorized	3,384	3.6	118.0	(101, 135)	233.0	(200, 266)	49.4
Foreign total	192,329	332.8	192.3	(190, 195)	283.1	(279, 287)	32.1
Total	742,297	1574.3	235.7	(234, 237)	319.0	(317, 321)	26.1

Notes: The prescription statistics are raw averages; that is, they do not control for specialty or county of practice. Standard errors are clustered by physician.

Table A5: Opioid Prescriptions by Medical School Rank: General Practitioners

	Unique physicians	Total (in millions)	Opioid prescriptions				
			Including zeroes		Excluding zeroes		
			Average per phy-yr	95% CI of average	Average per phy-yr	95% CI of average	Zeroes (% phys-yrs)
A. US trained							
Ranked							
1 (Harvard)	947	1.5	180.2	(153, 207)	248.9	(214, 284)	27.6
2-5	3,175	6.6	232.7	(217, 248)	298.4	(279, 317)	22.0
6-10	4,029	11.7	321.9	(306, 338)	398.1	(379, 417)	19.1
11-15	4,447	13.9	346.4	(330, 363)	410.8	(392, 430)	15.7
16-20	3,693	9.8	295.1	(280, 310)	354.2	(337, 372)	16.7
21-25	4,890	15.6	354.6	(339, 370)	420.0	(403, 437)	15.6
26-30	4,610	16.3	393.3	(377, 410)	444.4	(427, 462)	11.5
31-35	4,718	21.3	500.9	(478, 524)	580.5	(555, 606)	13.7
36-40	7,625	26.2	382.4	(370, 394)	435.8	(423, 449)	12.3
41-45	4,719	15.8	372.0	(354, 390)	436.7	(417, 457)	14.8
46-50	6,295	24.5	432.5	(418, 447)	498.6	(482, 515)	13.3
51-55	6,762	26.2	430.2	(415, 445)	488.3	(472, 505)	11.9
56-60	4,839	21.9	503.8	(483, 525)	562.8	(540, 585)	10.5
61-65	5,107	19.8	431.6	(413, 451)	495.7	(475, 517)	12.9
66-70	4,463	16.3	406.7	(390, 424)	484.7	(466, 503)	16.1
71-75	7,645	38.7	562.5	(546, 579)	627.6	(610, 645)	10.4
76-80	4,228	19.0	499.9	(477, 523)	569.7	(545, 595)	12.3
81-85	3,801	18.1	529.5	(505, 554)	600.9	(575, 627)	11.9
86-92	6,452	31.8	546.9	(528, 566)	613.7	(593, 635)	10.9
Unranked							
US (MD)	23,363	100.8	479.4	(470, 488)	542.4	(533, 552)	11.6
US (DO)	25,020	120.5	534.9	(525, 545)	608.5	(597, 620)	12.1
US total	140,828	576.4	454.8	(451, 458)	522.9	(519, 527)	13.0
B. Foreign trained							
Caribbean	8,904	31.2	388.9	(375, 403)	466.1	(450, 482)	16.5
Canada	2,064	8.6	463.6	(432, 495)	579.8	(543, 617)	20.0
Mexico + C America	4,203	16.3	431.0	(409, 453)	509.9	(485, 534)	15.5
South America	2,325	5.1	243.6	(226, 262)	327.5	(305, 350)	25.6
Western Europe	3,501	9.8	310.2	(287, 333)	396.4	(368, 424)	21.8
E Europe + Russia	4,451	11.3	281.8	(268, 296)	353.7	(337, 370)	20.3
W, S, and C Asia	23,502	61.8	292.1	(284, 300)	384.4	(375, 394)	24.0
SE and E Asia	8,472	25.8	337.9	(324, 352)	434.2	(417, 452)	22.2
Northern Africa	1,477	3.9	291.1	(262, 320)	393.6	(357, 431)	26.0
W and C Africa	1,759	5.4	338.2	(307, 370)	454.0	(414, 494)	25.5
E and South Africa	810	1.4	193.5	(166, 221)	278.1	(241, 315)	30.4
Oceania	138	0.3	202.7	(148, 257)	305.1	(232, 379)	33.6
Uncategorized	1,142	1.7	162.1	(142, 182)	272.9	(242, 304)	40.6
Foreign total	62,748	182.3	322.9	(318, 328)	414.9	(409, 421)	22.2
Total	203,576	758.8	414.1	(411, 417)	492.1	(489, 495)	15.8

Notes: Only GPs are included (physicians in general practice, family practice, and internal medicine). The prescription statistics are raw averages; that is, they do not control for specialty or county of practice. Standard errors are clustered by physician.

Table A6: Opioid Prescriptions by Physician Specialty

| | | | Opioid prescriptions | | | | |
| | Unique physicians | Total (in millions) | Including zeroes | | Excluding zeroes | | Zeroes (% phys-yrs) |
			Average per phys-yr	95% CI of average	Average per phys-yr	95% CI of average	
General Practice	203,576	758.8	414.1	(411, 417)	492.1	(489, 495)	15.8
Orthopaedic Surgery	24,385	147.2	670.5	(661, 681)	750.6	(740, 761)	10.7
Emergency Medicine	33,375	116.5	388.0	(384, 392)	429.7	(425, 434)	9.7
Pain Medicine	3,783	69.5	2040.2	(1947, 2133)	2454.7	(2349, 2560)	16.9
Physical Med & Rehab	8,218	62.2	841.2	(805, 877)	1028.0	(985, 1071)	18.2
Obstetrics & Gynecology	39,794	51.0	142.4	(140, 144)	166.1	(164, 168)	14.2
Anesthesiology	32,585	50.6	172.5	(162, 183)	460.6	(433, 488)	62.6
General Surgery	29,965	49.1	182.2	(179, 185)	224.9	(222, 228)	19.0
Neurology	14,092	30.9	243.3	(230, 256)	321.6	(305, 338)	24.3
Rheumatology	4,949	29.6	664.4	(636, 693)	775.4	(744, 807)	14.3
Hematology & Oncology	19,156	28.7	166.2	(163, 170)	196.7	(193, 201)	15.5
Neurological Surgery	5,540	19.5	391.2	(372, 410)	470.4	(448, 493)	16.8
Urology	10,099	17.6	193.8	(190, 198)	219.9	(216, 224)	11.9
Otolaryngology	9,588	17.3	200.7	(196, 205)	226.9	(222, 231)	11.5
Plastic Surgery	7,914	15.0	210.3	(205, 216)	237.9	(232, 244)	11.6
Sports Medicine	2,593	11.6	496.4	(474, 518)	552.9	(530, 576)	10.2
General other	6,593	10.9	183.2	(175, 191)	218.3	(209, 228)	16.1
Geriatrics	4,518	8.6	212.3	(198, 226)	275.2	(258, 293)	22.9
Cardiovascular Disease	23,274	8.2	39.4	(38, 41)	51.0	(49, 53)	22.8
Pediatrics	50,584	7.5	16.6	(16, 17)	24.5	(24, 26)	32.5

Notes: The displayed specialties are the 20 specialties out of 57 specialties with the most opioid prescriptions collectively from 2006-2014. "General Practice" includes physicians in general practice, family practice, and internal medicine. The prescription statistics are raw averages; that is, they do not control for county of practice. Standard errors are clustered by physician.

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Table A7: Opioid Prescriptions by Medical School Rank Across Cohorts

A. All physicians

	Annual opioid prescriptions (including zeroes)				
	(1)	(2)	(3)	(4)	(5)
Graduation cohort:	All	≤ 1975	1976-1985	1986-1995	1996-2005
Medical rank	0.635***	1.242***	0.718***	0.481**	0.264*
	(0.109)	(0.219)	(0.242)	(0.240)	(0.143)
(Medical rank)^2	-0.003***	-0.009***	-0.003	-0.002	-0.000
	(0.001)	(0.003)	(0.003)	(0.003)	(0.002)
Constant	111.570***	29.659	185.029***	220.612	417.002
	(31.767)	(21.114)	(47.655)	(159.558)	(297.311)
N (physician-years)	3,635,532	675,396	936,018	1,006,704	1,017,414
R^2	0.194	0.181	0.236	0.232	0.226

B. General practitioners

	Annual opioid prescriptions (including zeroes)				
	(1)	(2)	(3)	(4)	(5)
Graduation cohort:	All	≤ 1975	1976-1985	1986-1995	1996-2005
Medical rank	2.418***	3.551***	3.210***	2.073***	1.277***
	(0.292)	(0.745)	(0.613)	(0.547)	(0.410)
(Medical rank)^2	-0.018***	-0.027***	-0.026***	-0.014**	-0.009**
	(0.003)	(0.009)	(0.007)	(0.006)	(0.004)
Constant	354.644***	354.397***	437.960***	375.733***	247.608***
	(6.264)	(16.873)	(12.799)	(11.540)	(8.794)
N (physician-years)	832,005	132,849	232,596	244,278	222,282
R^2	0.178	0.256	0.261	0.241	0.264

C. Pain medicine

	Annual opioid prescriptions (including zeroes)				
	(1)	(2)	(3)	(4)	(5)
Graduation cohort:	All	≤ 1975	1976-1985	1986-1995	1996-2005
Medical rank	-2.825	-40.905	-4.020	16.392	7.412
	(9.272)	(69.125)	(32.154)	(21.533)	(11.196)
(Medical rank)^2	0.031	0.093	0.080	-0.175	-0.001
	(0.101)	(0.878)	(0.358)	(0.231)	(0.113)
Constant	1355.253***	3964.478***	2343.257***	1575.692***	-71.116
	(199.171)	(1079.542)	(650.081)	(431.728)	(266.479)
N (physician-years)	15,318	882	2,790	5,094	6,552
R^2	0.353	0.657	0.613	0.538	0.425

Notes: The above table presents output from regressions of opioid prescriptions at the physician-year level on a quadratic in medical school rank with year, specialty, and county fixed effects (Equation (2)) estimated separately across different graduation cohorts. Standard errors are clustered by physician. Panel A includes all physicians; Panel B only includes GPs (physicians in general practice, family practice, and internal medicine); Panel C only includes physicians specializing in pain medicine.

Table A8: Opioid Prescriptions by Medical School Rank Controlling for Specialty and County of Practice

| | Annual opioid prescriptions | | | | | |
| | Including zeroes | | Excluding zeroes | | I[zero] | |
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
A. By medical school rank						
1 (Harvard)	0	-	0	-	0	-
2-5	1.91	(4.27)	0.33	(5.99)	-0.02***	(0.00)
6-10	16.30***	(4.42)	16.93***	(6.17)	-0.03***	(0.00)
11-15	17.00***	(4.57)	14.52**	(6.28)	-0.05***	(0.00)
16-20	23.00***	(4.54)	21.86***	(6.24)	-0.05***	(0.00)
21-25	18.49***	(4.50)	17.29***	(6.17)	-0.05***	(0.00)
26-30	30.99***	(4.84)	29.96***	(6.58)	-0.05***	(0.00)
31-35	34.27***	(5.27)	31.98***	(7.04)	-0.06***	(0.00)
36-40	25.37***	(4.69)	23.38***	(6.36)	-0.06***	(0.00)
41-45	25.95***	(5.06)	22.82***	(6.86)	-0.06***	(0.00)
46-50	27.99***	(4.54)	25.86***	(6.15)	-0.06***	(0.00)
51-55	37.16***	(4.54)	36.59***	(6.14)	-0.06***	(0.00)
56-60	38.65***	(5.26)	33.11***	(6.97)	-0.07***	(0.00)
61-65	31.48***	(4.95)	29.34***	(6.71)	-0.06***	(0.00)
66-70	17.83***	(4.99)	21.51***	(6.77)	-0.03***	(0.00)
71-75	49.85***	(5.15)	44.37***	(6.81)	-0.07***	(0.00)
76-80	38.96***	(6.34)	35.70***	(8.29)	-0.07***	(0.00)
81-85	36.86***	(5.99)	35.10***	(7.83)	-0.07***	(0.00)
86-92	41.75***	(5.25)	34.50***	(6.95)	-0.07***	(0.00)
Unranked US (MD)	39.89***	(4.03)	35.69***	(5.58)	-0.07***	(0.00)
Unranked US (DO)	85.63***	(4.95)	85.53***	(6.46)	-0.06***	(0.00)
Foreign	-14.07***	(3.79)	-4.55	(5.36)	0.02***	(0.00)
B. By regions of training						
Rank 1-30	0	-	0	-	0	-
31-60	14.10***	(1.73)	12.53***	(2.23)	-0.02***	(0.00)
61-92	19.67***	(2.00)	17.59***	(2.55)	-0.02***	(0.00)
Unranked US (MD)	22.49***	(2.21)	19.18***	(2.81)	-0.03***	(0.00)
Unranked US (DO)	67.99***	(3.61)	68.79***	(4.28)	-0.02***	(0.00)
Caribbean	5.88	(4.60)	14.96**	(5.92)	0.01***	(0.00)
Canada	-4.69	(5.36)	14.60**	(7.31)	0.07***	(0.00)
Mexico + C America	29.99***	(5.90)	40.17***	(7.40)	-0.01***	(0.00)
South America	-46.63***	(4.66)	-40.44***	(6.77)	0.08***	(0.00)
Western Europe	-13.49***	(4.42)	-2.33	(6.45)	0.07***	(0.00)
E Europe + Russia	-44.53***	(4.67)	-42.60***	(6.57)	0.05***	(0.00)
W, S, and C Asia	-47.78***	(2.40)	-40.53***	(3.30)	0.06***	(0.00)
SE and E Asia	-40.19***	(3.71)	-29.63***	(5.36)	0.07***	(0.00)
Northern Africa	-19.20	(11.81)	1.39	(16.90)	0.06***	(0.00)
W and C Africa	-38.97***	(8.47)	-19.44*	(11.70)	0.08***	(0.00)
E and South Africa	-57.82***	(7.61)	-55.52***	(10.77)	0.07***	(0.01)
Oceania	-58.35***	(10.37)	-56.02***	(16.23)	0.14***	(0.01)
Uncategorized	-89.76***	(8.59)	-70.70***	(15.59)	0.20***	(0.01)

Notes: The prescription statistics control for specialty and county of practice and are relative to either Harvard (Panel A) or the top 30 schools (Panel B). Standard errors are clustered by physician.

Table A9: Opioid Prescriptions by Medical School Rank Controlling for Specialty and County of Practice: GPs

| | Annual opioid prescriptions | | | | | |
| | Including zeroes | | Excluding zeroes | | I[zero] | |
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
A. By medical school rank						
1 (Harvard)	0	-	0	-	0	-
2-5	6.64	(15.31)	5.42	(19.72)	-0.03***	(0.01)
6-10	49.94***	(15.40)	50.82***	(19.72)	-0.05***	(0.01)
11-15	55.59***	(15.65)	47.53**	(19.83)	-0.08***	(0.01)
16-20	46.20***	(15.20)	39.53**	(19.35)	-0.08***	(0.01)
21-25	60.95***	(15.16)	51.25***	(19.30)	-0.08***	(0.01)
26-30	97.40***	(15.73)	87.96***	(19.73)	-0.10***	(0.01)
31-35	111.66***	(16.59)	103.54***	(20.69)	-0.09***	(0.01)
36-40	88.33***	(14.85)	78.90***	(18.92)	-0.10***	(0.01)
41-45	64.06***	(15.93)	52.70***	(20.09)	-0.08***	(0.01)
46-50	86.77***	(15.08)	77.79***	(19.12)	-0.10***	(0.01)
51-55	113.82***	(15.07)	105.32***	(19.09)	-0.10***	(0.01)
56-60	133.52***	(16.74)	116.44***	(20.65)	-0.11***	(0.01)
61-65	91.34***	(15.87)	77.10***	(19.91)	-0.10***	(0.01)
66-70	66.45***	(15.89)	73.15***	(20.02)	-0.06***	(0.01)
71-75	137.10***	(15.77)	119.81***	(19.70)	-0.11***	(0.01)
76-80	80.64***	(16.72)	64.85***	(20.68)	-0.09***	(0.01)
81-85	118.01***	(17.67)	106.02***	(21.62)	-0.10***	(0.01)
86-92	115.03***	(16.00)	92.48***	(20.01)	-0.11***	(0.01)
Unranked US (MD)	98.00***	(14.05)	79.71***	(18.16)	-0.11***	(0.01)
Unranked US (DO)	123.64***	(14.33)	120.13***	(18.41)	-0.09***	(0.01)
Foreign	15.47	(13.55)	31.14*	(17.73)	-0.02	(0.01)
B. By regions of training						
Rank 1-30	0	-	0	-	0	-
31-60	46.39***	(4.56)	41.19***	(5.12)	-0.03***	(0.00)
61-92	51.28***	(4.95)	42.97***	(5.54)	-0.03***	(0.00)
Unranked US (MD)	44.58***	(5.44)	31.37***	(6.07)	-0.04***	(0.00)
Unranked US (DO)	71.10***	(6.06)	72.58***	(6.72)	-0.02***	(0.00)
Caribbean	15.01*	(7.73)	23.55***	(8.80)	0.00	(0.00)
Canada	35.91**	(15.25)	71.68***	(17.81)	0.05***	(0.01)
Mexico + C America	69.48***	(11.24)	83.89***	(12.67)	-0.01**	(0.00)
South America	-93.09***	(9.67)	-79.11***	(11.85)	0.08***	(0.01)
Western Europe	2.84	(11.12)	22.31*	(13.52)	0.04***	(0.01)
E Europe + Russia	-37.95***	(7.72)	-26.09***	(9.00)	0.03***	(0.00)
W, S, and C Asia	-74.50***	(5.00)	-54.32***	(5.99)	0.07***	(0.00)
SE and E Asia	-27.10***	(7.73)	-7.07	(9.32)	0.05***	(0.00)
Northern Africa	-74.43***	(14.87)	-49.87***	(18.71)	0.09***	(0.01)
W and C Africa	-48.76***	(15.84)	-12.53	(19.83)	0.09***	(0.01)
E and South Africa	-139.10***	(14.63)	-131.26***	(19.23)	0.13***	(0.01)
Oceania	-132.62***	(28.13)	-112.65***	(36.33)	0.16***	(0.03)
Uncategorized	-156.49***	(10.95)	-118.82***	(15.58)	0.23***	(0.01)

Notes: Only GPs are included (physicians in general practice, family practice, and internal medicine). The prescription statistics control for specialty and county of practice and are relative to either Harvard (Panel A) or the top 30 schools (Panel B). Standard errors are clustered by physician.

Table A10: Opioid Prescriptions by Medical School Rank Excluding University-Affiliated Zip Codes

| | Annual opioid prescriptions (including zeroes) | | | |
| | All physicians | | General practitioners | |
	(1)	(2)	(3)	(4)
Medical rank	0.635***	0.814***	2.418***	2.325***
	(0.109)	(0.168)	(0.292)	(0.415)
(Medical rank)^2	-0.003***	-0.006***	-0.018***	-0.018***
	(0.001)	(0.002)	(0.003)	(0.004)
Constant	111.570***	93.507**	354.644***	391.920***
	(31.767)	(36.805)	(6.264)	(9.011)
Excl. uni. zips	No	Yes	No	Yes
N (physician-years)	3,635,532	1,922,193	832,005	539,064
R^2	0.194	0.209	0.178	0.186

Notes: The above table presents output from regressions of opioid prescriptions at the physician-year level on a quadratic in medical school rank with year, specialty, and county fixed effects (Equation (2)). Columns (1)-(2) include all physicians; Columns (3)-(4) only include GPs (physicians in general practice, family practice, and internal medicine). Columns (2) and (4) exclude physicians whose practice address is in a zip code with a university-affiliated hospital. Standard errors are clustered by physician.

Table A11: Opioid Prescriptions and Deaths Involving Drugs

| | ln(Deaths involving drugs per capita) | |
	(1)	(2)
ln(Opioid prescriptions per capita)	0.286***	0.150***
	(0.026)	(0.040)
County FEs	No	Yes
N (county-years)	22,801	22,801
R^2	0.118	0.706

Notes: The above table presents output from regressions of log deaths involving drugs per capita at the county-year year on log opioid prescriptions per capita at the county-year level. All specifications include year fixed effects. Standard errors are clustered by county. We define "deaths involving drugs" as both poisonings from drugs resulting in death as well as deaths in which drug dependence was indicated on the death certificate.