Providers, Places, and Children's Mental Health Care

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Online Appendix

Data Appendix

A.1 Defining HRR of residence

In this section, I describe how I define the HRR of residence for each child-year. The BCBS member files include monthly ZIP codes of residence, which I match to the corresponding HRRs using the Dartmouth Atlas crosswalk. However, there are a number of cases, particularly around potential moves, where children are observed to be in multiple HRRs for overlapping periods that can be non-negligible.

For each child, I aggregate all claims to the HRR-half-year level. Within each half-year, I keep the HRR associated with the most claims, and calculate the length of residence in that HRR. If there are multiple HRRs within a given half-year and all have no claims, I first attempt to assign the reference half-year's HRR as the most recent previous half-year with an HRR assignment. If there is no previous half-year with an HRR assignment, I assign the reference half-year's HRR as the closest future half-year with an HRR assignment. If there is also no future half-year with an HRR assignment, I code the HRR as missing for that half-year. For a given year, if the HRR of residence is the same across the two halves of the year, I assign that as the HRR. If the HRR is different across the two half-years within a given year, I keep the HRR with the longer length of residence.

A.2 Assigning PCPs

In this section, I describe how I assign each child a PCP in each year. For each non-facility claim, I observe the date of service and the NPI of the rendering (for a non-facility, non-pharmaceutical claims) or prescribing (for pharmaceutical claims) provider. Additionally, I observe the Berenson-Eggers Type of Service (BETOS) codes associated with non-

pharmaceutical claims (based on the HCPCS procedure codes, which I also observe). I link the provider NPIs to specialty data from the NPPES.

I collapse the data to count total number of claims, number of office visits (*BETOS: M1a/b*), number of well-visit claims (*ICD-10: Z00, Z13.31, Z13.39, Z71.1, Z71.2, Z71.3, Z71.8; ICD-9: V20, V70.0, V65.3, V65.41, V65.5, V65.8, V65.9; CPT: 99381, 99382, 99384, 99385, 99391, 99392, 99393, 99394, 99395)*, and number of prescriptions for each child-provider-year.

I then categorize providers into three groups based on their specialty codes, and keep only the first two groups as potential PCPs.

- **Group 1 - Typical PCP specialties:** General Practitioners (*208D00000X, 208M00000X*), Family Medicine, Internal Medicine, Pediatrics
- **Group 2 - All other providers, excluding the following specialties:**
    - Ambulance, Anesthesiology, Assisted Living Facility, Audiologist, Chiropractor, Contractor, Counselor, Dentist, Dermatology, Dietitian, Registered, Durable Medical Equipment and Medical Supplies, Medical Genetics, Nuclear Medicine, Nutritionist, Obstetrics and Gynecology, Occupational Therapist, Occupational Therapy Assistant, Ophthalmology, Optometrist, Orthopaedic Surgery, Pathology, Pharmacist, Pharmacy, Physical Medicine and Rehabilitation, Physical Therapist, Plastic Surgery, Podiatrist, Psychologist, Radiologic Technologist, Radiology, Rehabilitation Counselor, Rehabilitation Hospital, Respiratory Therapist, Certified, Respiratory Therapist, Registered, Respite Care, Skilled Nursing Facility, Social Worker, Specialist, Specialist/Technologist, Specialist/Technologist Cardiovascular, Specialist/Technologist Other, Specialist/Technologist Pathology, Substance Abuse Rehabilitation Facility,

Surgery, Technician, Technician, Health Information, Technician, Other, Technician, Pathology, Technician/Technologist.

- **Group 3 - Specialties excluded in Group 2**

I then assign the PCP for each child-year as follows. I assign the PCP as the Group 1 provider with the most office visits, breaking ties with the number of well-visit claims. If the child had no office visits to Group 1 providers in that year, but saw a Group 1 provider, I assign the PCP as the Group 1 provider with the most claims, breaking ties with the number of prescriptions. If the child did not see a Group 1 provider in that year, I assign the PCP as the Group 2 provider with the most office visits, breaking ties with the number of prescriptions. If the child-year remains unmatched, I assign their PCP as missing.

A.3 HRRs as markets for children's mental health care

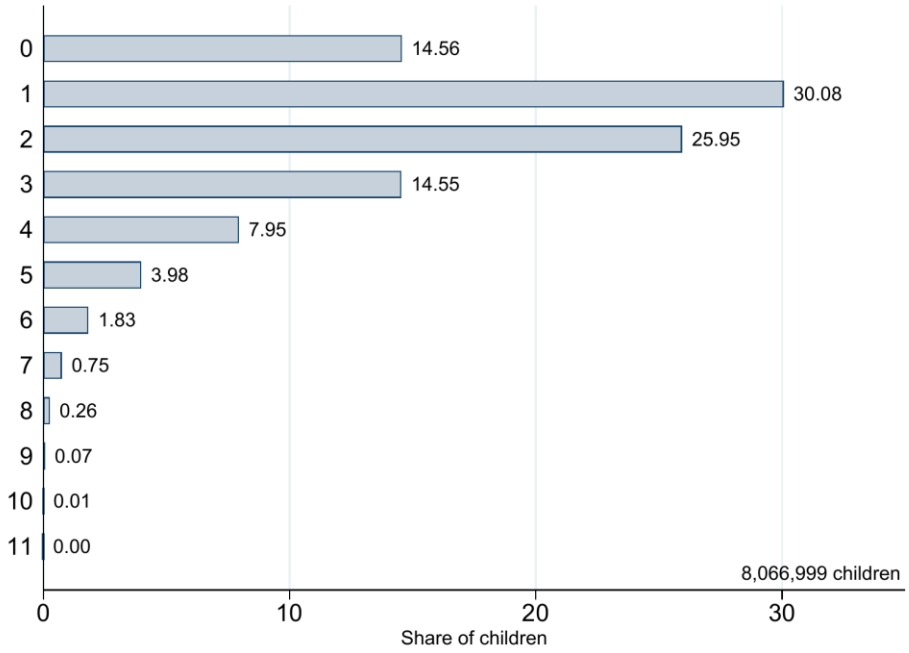
In this section, I document the extent to which children in the sample receive care from providers whose primary practice location matches the child's HRR of residence. For the purposes of this analysis, I define a provider's primary HRR of practice as the HRR of residence for the plurality of their BCBS patients (including adults and children).

PCP-child HRR matches. Overall, 85.66 percent of child-years are matched to a PCP whose primary HRR of practice matches the child's HRR of residence. There is a small degree of variation across regions in the match rate: the standard deviation is 11.64 percentage points (not weighting by the HRR's associated number of child-years). Match rates are highest in Kansas City, MO and Buffalo, NY (above 96 percent) and lowest in Sun City, AZ and the Bronx, NY (below 30 percent), reflecting the geographic features of these HRRs.

Mental health specialist visits within and across HRRs. Children saw a psychiatrist in 5.14 percent of sample child-years. Conditional on seeing a psychiatrist, 65.76 percent of child-years

involved a psychiatrist whose primary HRR of practice matched the child's HRR of residence. Of the 34.24 percent who saw an "out-of-HRR" psychiatrist, 12.18 percentage points were also matched to an out-of-HRR PCP, while the remaining 22.06 percentage points were matched to a PCP who primarily practiced within the child's HRR of residence. The standard deviation across HRRs of the share of children seeing an out-of-HRR psychiatrist while seeing an in-HRR PCP is 12.11 percentage points (compared to the overall share of 22.06 percent). To the extent that children see out-of-HRR psychiatrists at the direction of an in-HRR PCP, the model's attribution of prescribing to the PCP and assignment of the child to their HRR of residence remains appropriate.

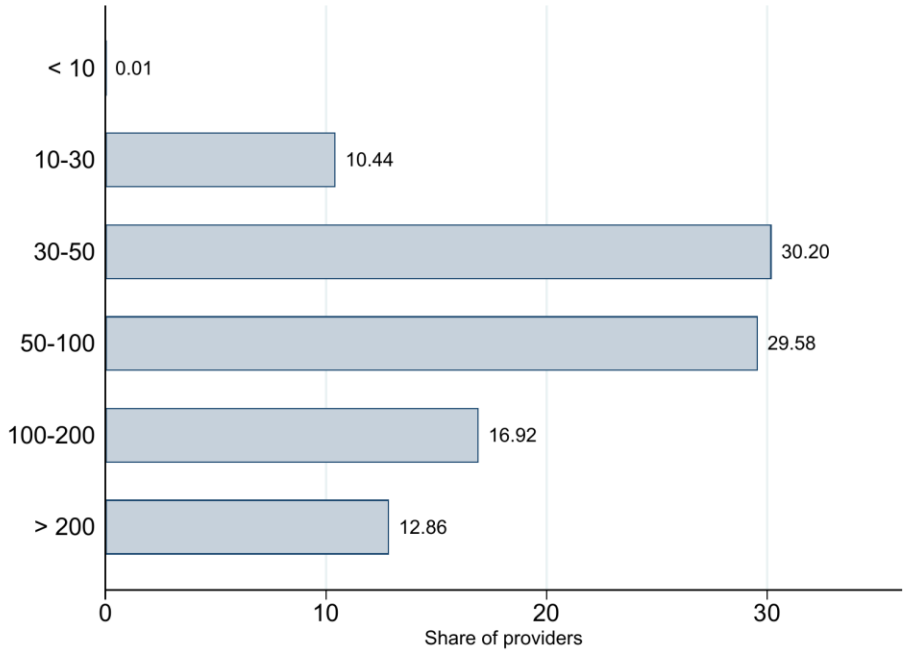
Appendix Figures and Tables



Appendix Figure A1

Distribution of number of PCPs per child

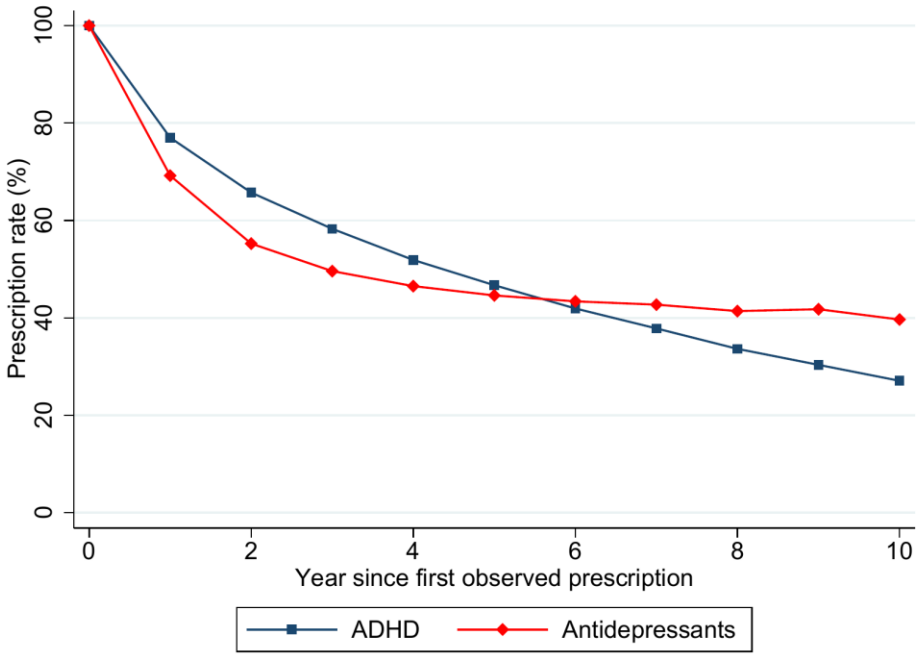
Notes: Figure shows the distribution across children of the number of different PCPs they are matched to in the sample. See Section A.2 for details of the PCP matching algorithm. The sample is the analysis sample (N = 8,066,999).



Appendix Figure A2

Distribution of number of switchers per provider

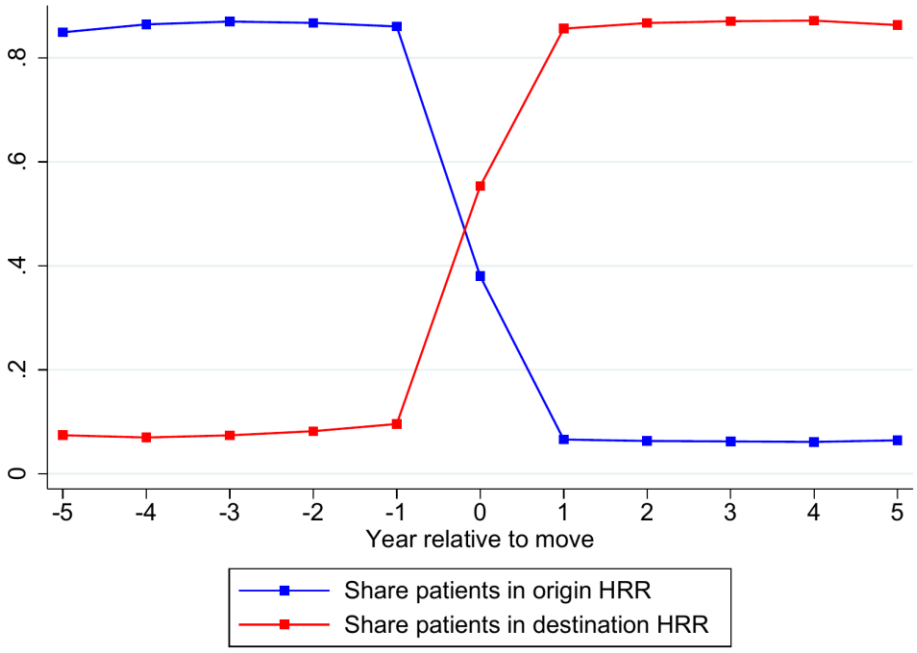
Notes: Figure shows the distribution of the number of switcher children providers are matched to in the sample. A child is defined as a switcher if they are matched to at least two different PCPs. Almost 90 percent of providers in the sample are matched to more than 30 switchers. The sample is providers in the analysis sample (N = 130,616). For comparison, in the Swedish linked establishment-worker data used by Bonhomme, Lamadon, and Manresa (2019), only 74 of 8,794 firms (0.8 percent) have at least 50 employees who switch firms.



Appendix Figure A3

Child prescription hazard rates

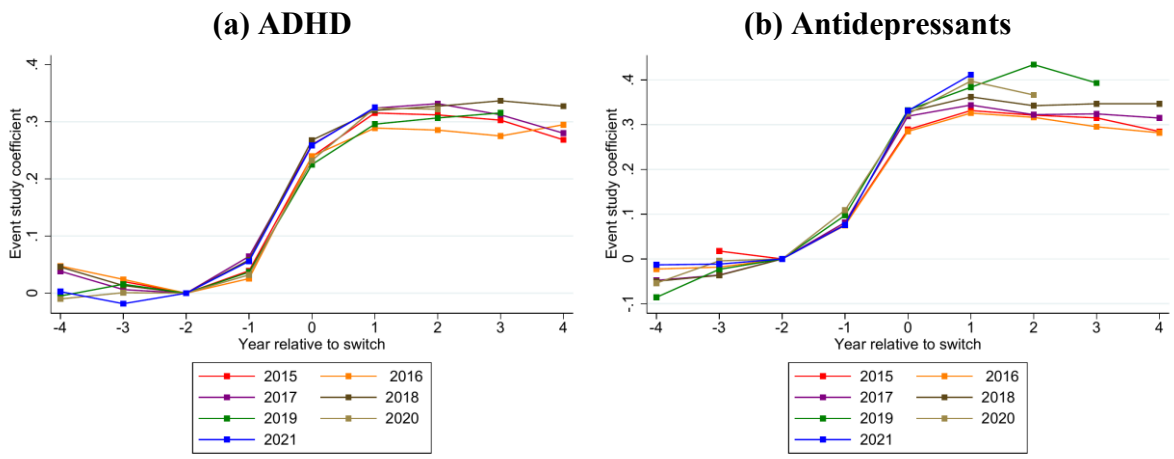
Notes: Figure shows the prescribing rates for ADHD medication and antidepressants in the years following a child's first observed prescription. The sample includes all child-years from the analysis sample following a child's first observed ADHD or antidepressant prescription, through the final year the child is observed in the sample.



Appendix Figure A4

Provider mover origin-destination patient shares

Notes: Figure displays the average provider-year share of patients residing in the origin HRR and destination HRR by relative year for provider movers. These measures include all BCBS-covered patients provider saw, not only children. Movers are determined by identifying providers with a clear shift in the residence of their patient population (all patient, not only children) from one HRR to another, following the algorithm from Badinski et al. (2026). Shares are computed on a sample of 15,842 provider movers.



Appendix Figure A5

Switching event studies separately by year

Notes: Figure plots the estimated θ_w coefficients from the first switch sample event studies estimated separately by the year of the switch. Regression includes controls for age bins (5-9, 10-14, 15-21), but do not include relative-year fixed effects as these would be collinear with the calendar year fixed effects when estimating the event study separately by switch year. Panel A shows the results for ADHD medications, Panel B shows the results for antidepressants. The coefficients for year -2 are normalized to 0.

Appendix Table A1

Utilization differences by leaving BCBS status

	ADHD	Antidepressants	Log(Total Spending)	Any mental health spending?	Log(mental health spending)	Hospital?	Emergency room visit?
BCBS stayer mean	4.72	4.95	6.79	48.75	5.24	1.05	9.83
Panel A: Differences in means							
Leaver	-0.14	-1.39	-0.23	-5.10	-0.20	-0.14	-0.09
	(0.01)	(0.01)	(0.00)	(0.03)	(0.00)	(0.00)	(0.01)
Before return	0.43	-2.20	-0.39	-3.10	-0.33	-0.60	-1.12
	(0.03)	(0.02)	(0.00)	(0.05)	(0.00)	(0.01)	(0.02)
After return	0.52	1.99	0.13	1.47	0.12	0.45	-0.22
	(0.03)	(0.03)	(0.00)	(0.05)	(0.00)	(0.01)	(0.02)
Panel B: Controlling for year, age, and gender fixed effects							
Leaver	-0.35	-0.21	-0.12	-4.86	-0.09	0.15	0.30
	(0.01)	(0.01)	(0.00)	(0.02)	(0.00)	(0.01)	(0.02)
Before return	0.18	0.09	-0.06	-1.42	-0.08	0.14	0.20
	(0.01)	(0.01)	(0.00)	(0.03)	(0.00)	(0.01)	(0.02)
After return	0.35	0.72	-0.06	0.65	-0.05	0.07	-0.46
	(0.01)	(0.01)	(0.00)	(0.03)	(0.00)	(0.01)	(0.02)

Notes: Table reports means (row 1) and (Panels A and B) regression coefficients for individuals who leave and later return to BCBS insurance. Panel A shows the results of regressing the given utilization measure on indicators for the leaver status of that child-year. Panel B shows the results after controlling for age, year, and gender. BCBS stayers are the omitted category in the regressions. Standard errors clustered by child are reported in parentheses. ADHD, Antidepressants, Any MH Spending, Hospital, and ER are measured as 0 or 100 for scaling purposes, and coefficients are interpreted as percentage point changes. Table sample is the BCBS base sample.

Appendix Table A2

Movement between Census Regions - child movers

		Destination				
		Midwest	Northeast	South	West	Total
Origin	Midwest	16.98	0.65	5.27	1.76	24.66
	Northeast	0.78	7.68	4.57	0.76	13.78
	South	3.21	2.09	37.06	2.28	44.63
	West	1.45	0.61	3.45	11.41	16.93
	Total	22.42	11.03	50.34	16.21	100.00

Notes: Table shows the percentage of child moves that take place between each of the 16 origin-destination pairs of census regions. 55 percent of child moves occur across state lines across non-neighboring HRRs. The sample size is all child movers (N = 243,940 children)

Appendix Table A3

Movement between Census Regions - provider movers

		Destination				
		Midwest	Northeast	South	West	Total
Origin	Midwest	13.45	1.22	4.90	3.41	22.98
	Northeast	0.93	10.35	4.89	1.77	17.94
	South	2.54	2.23	34.48	3.76	43.01
	West	1.11	0.61	2.14	12.21	16.08
	Total	18.03	14.41	46.40	21.15	100.00

Notes: Table shows the percentage of providers moves that take place between each of the 16 origin-destination pairs of census regions. The sample size is provider movers (N = 15,842 providers).

Appendix Table A4

Geographic variation decomposition with small providers

	Above/below median		Top/bottom 25%		Top/bottom 10%	
	ADHD meds	Antidepressants	ADHD meds	Antidepressants	ADHD meds	Antidepressants
Observed difference (pp)	2.65	2.21	4.00	3.44	6.25	4.76
Average provider share (%)	2.54	2.19	3.92	3.40	6.06	5.39
Practice environment share (%)	47.84	33.43	45.77	31.99	48.69	27.37
Average child share (%)	66.53	65.77	64.40	67.50	66.51	67.74
$X\beta$ share (%)	-2.62	-12.92	-2.45	-13.08	-2.61	-9.37

Notes: Table reports results from re-estimating the geographic decomposition from Table 2 using the Base BCBS child sample that includes child-years matched to small providers. Specifically, I group child-years matched to small providers by HRR into a set of "small provider" fixed effects and re-estimate Equation 1 when including these observations and report the resulting geographic decomposition. The sample is the Base BCBS child sample (N = 11,495,405 children, 47,427,135 child-years).

Appendix Table A5

Provider variation decomposition with small providers

	ADHD medication		Antidepressants	
	Variance component	Share	Variance component	Share
Variance of prescribing	45.45	100.00	56.99	100.00
Share of variation explained by:				
Variance of provider effects	13.41	29.51	23.81	41.78
Variance of average child effects	20.79	45.73	20.49	35.96
Variance of average HRR effect	1.37	3.02	1.16	2.04
Variance of average Xβ	0.13	0.28	2.10	3.69
Variance of average residual	0.00	0.00	0.00	0.00
2cov(average child, provider)	10.14	22.31	12.00	21.06
2cov(average child, average HRR)	1.37	3.01	0.60	1.05
2cov(provider, average HRR)	-1.39	-3.06	-1.01	-1.77
$א_{cov}$		-0.80		-3.81

Notes: Table reports results from re-estimating the PCP decomposition from Table 3 using the Base BCBS child sample that includes child-years matched to small providers. Within each medication, the first column reports the variance (or covariance) of the specified component, and the second column reports that component's share of the overall variance of provider prescribing rates. I group child-years matched to small providers by HRR into a set of "small provider" fixed effects and re-estimate Equation 1 when including these observations and report the resulting provider decomposition. The sample is the Base BCBS child sample (N = 11,495,405 children, 47,427,135 child-years).

Appendix Table A6

Characteristics of providers in the sample

	Number of providers	Share of providers	Share of child-years
Gender:			
Male	52,054	39.85	43.87
Female	69,492	53.20	47.33
Missing	9,070	6.94	8.80
Specialty:			
Family Medicine	37,424	28.65	22.54
Internal Medicine	8,610	6.59	4.94
NP/PA	24,005	18.38	10.15
Pediatrics	38,079	29.15	52.50
Other	18,967	14.52	7.86
Missing	3,531	2.70	2.00
Physician experience:			
≤ 13	3,442	2.64	1.87
14-20	10,776	8.25	8.46
21-30	21,351	16.35	22.33
31-40	17,264	13.22	18.28
40+	11,914	9.12	11.52
Missing	65,869	50.43	37.53
Physician medical school rank:			
Unranked	18,408	14.09	16.84
95-124	4,814	3.69	3.56
50-95	15,064	11.53	16.12
25-50	7,818	5.99	8.23
10-25	3,922	3.00	4.00
Top 10	1,708	1.31	1.68
Missing	78,882	60.39	49.56
Physician medical school country:			
Non-US med school	6,814	5.22	5.93
US med school	44,920	34.39	44.50
Missing	78,882	60.39	49.56

Notes: Table reports summary statistics of provider characteristics for providers in the analysis sample (N = 130,616). Provider gender and specialty are drawn from the NPPES. Experience and medical school information are drawn from IQVIA data covering only physicians (i.e. it does not cover Nurse Practitioners and Physician Assistants).