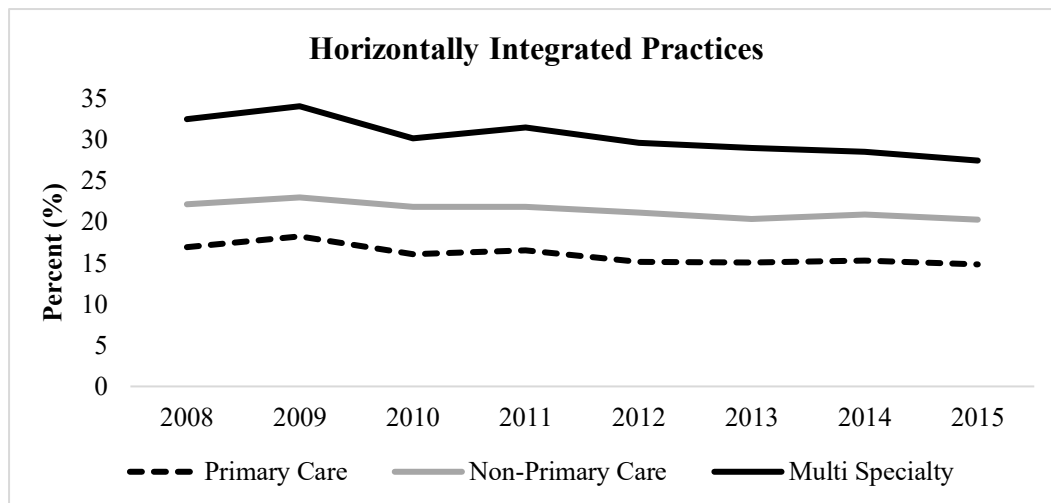


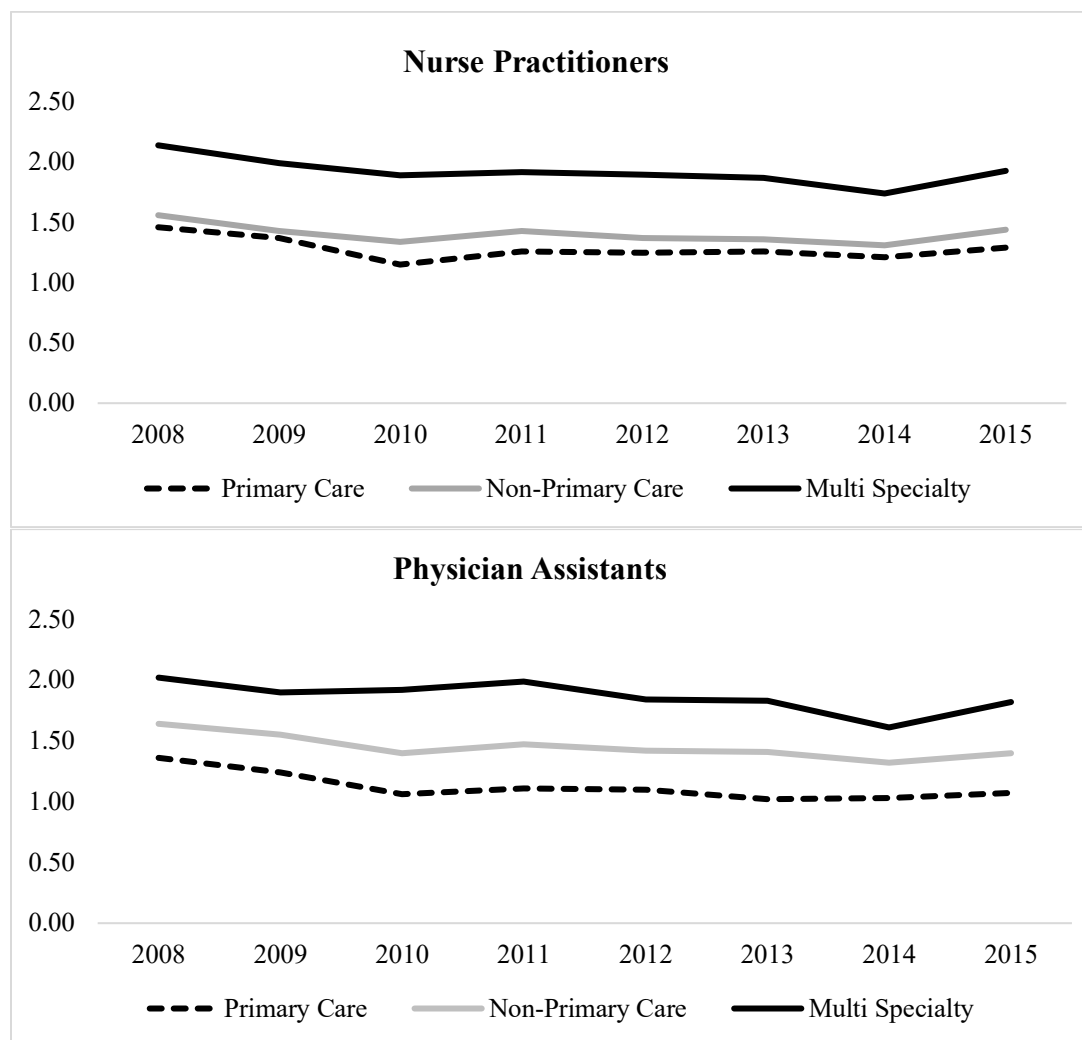
## Vertical Integration and Physician Practice Labor Composition

### Appendix



**Figure A1.** Trends in physician practice horizontal integration 2008-2015.

“Horizontal” practices report physician group ownership. Balanced panel of 144,289 practices across eight years. Primary care = 50,635 practices. Non-primary care = 76,773 practices. Multispecialty = 16,881 practices. Practice specialty designated by SK&A reported practice specialty in the baseline year (2008). Primary care includes family practice, general practice, geriatric medicine, internal medicine, and pediatrics. Non-primary care includes single medical and surgical specialty fields.



**Figure A2.** Average number of nurse practitioners and physician assistants employed within vertically integrated physician practices. Data are from SK&A and are restricted to vertically integrated practices within a given year that report having at least one of the relevant clinicians employed in the baseline year (2008). “Vertical” practices report hospital/health system ownership (i.e., hospital-physician integration).

Table A1.

Average Number of Physicians Per Practice by Ownership Status

	2008	2009	2010	2011	2012	2013	2014	2015
Independent Practices	1.82	1.87	2.01	1.87	1.85	1.81	1.73	1.68
Horizontally Integrated	5.05	5.07	5.13	5.09	5.10	5.06	4.93	4.82
Vertically Integrated	5.76	5.91	6.35	6.03	5.75	5.56	4.93	4.66

Note. Data restricted to 144,289 practices that are present in all years of data (i.e., balanced panel). “Vertical” practices report hospital/health system ownership (i.e., hospital-physician integration), while “Horizontal” practices report physician group ownership.



Oregon	1	1	1	1	1	1	1	1
Pennsylvania	0	0	0	0	0	0	0	0
Rhode Island*	0	0	0	0	0	1	1	1
South Carolina	0	0	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0	0
Texas	0	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0	0
Vermont*	0	0	0	0	1	1	1	1
Virginia	0	0	0	0	0	0	0	0
Washington	1	1	1	1	1	1	1	1
West Virginia	0	0	0	0	0	0	0	0
Wisconsin	0	0	0	0	0	0	0	0
Wyoming	1	1	1	1	1	1	1	1

Note: 0 = Restrictive scope of practice; collaborative agreements required for NP practice and/or prescriptive authority. 1 = full NP practice authority; no collaborative agreements required.

\*State changed to full NP practice authority during study period.

Table A3.

Association of a Change in Vertical Integration Status on  
Advanced Practice Provider Employment using a Logistic  
Regression Model: 2008-2015

	Pr(Employ NP)	Pr(Employ PA)
Vertical	0.009 (0.004)*	-0.004 (0.005)
Year FEs	Yes	Yes
Practice FEs	Yes	Yes
Covariates	Yes	Yes
Observations	259,955	192,107
Unique Practices	32,495	24,014

Note. NP = nurse practitioner. PA = physician assistant. FEs = fixed effects. CI = Confidence Interval. “Vertical” practices report hospital/health system ownership (i.e., hospital-physician integration). Outcomes are binary indicators for employing at least one of the specified advanced practice provider (i.e., NP and PA). Covariates include: number of physicians in the practice, a dummy for full independence for NP scope of practice, and county-level demographics.

\* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

Table A4.

Association between Vertical Integration and Practice Patient Volume and Multispecialty Status

	<u>Patient Volume</u>		<u>Pr(Multispecialty Practice)</u>	
	Primary Care	Non-Primary Care	Primary Care	Non-Primary Care
	(1)	(2)	(3)	(4)
Vertical	4.06*** (0.398)	2.50*** (0.710)	0.029*** (0.003)	0.024*** (0.002)
Year FEs	Yes	Yes	Yes	Yes
Practice FEs	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
Observations	405,060	614,184	405,060	614,184
Unique Practices	50,635	76,773	50,635	76,773
Sample Mean	44.45	43.27	0.05	0.04

Note: FEs = fixed effects. Data are from SK&A and include practices present for all eight years. “Vertical” practices report hospital/health system ownership (i.e., hospital-physician integration). Covariates include: number of physicians in the practice, a dummy for full independence for NP scope of practice, rural location, % non-white population, % adults older than 65, % uninsured, % living in poverty, and unemployment rate. Standard errors clustered at the practice level.

\* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

Patient Volume Measure Description. Patient volume is self-reported information within the SK&A data (i.e., it is not confirmed via billing information or other administrative data). It is also intended to represent a typical day for the practice, rather than a precise calculation. Obviously, there will be measurement error in this variable; however, we do not suspect that there are strong reasons to believe it would be systematically inflated for newly integrated practices when they are reporting to an unaffiliated third-party (i.e., SK&A).

Table A5.

Vertical Integration and Annual Physician-Level Procedure Output for Non-Primary CareSpecialists in Florida

	<u>Outpatient Procedures</u>	<u>Inpatient Procedures</u>	<u>Total Procedures</u>
	(1)	(2)	(3)
Vertical	15.64*** (4.41)	2.58 (1.46)	18.22*** (4.71)
Year FEs	Yes	Yes	Yes
Physician FEs	Yes	Yes	Yes
Observations	40,680	40,680	40,680
Unique Physicians	5,085	5,085	5,085
Sample Mean	186.90	75.24	262.14

Note: FEs = fixed effects. Physician-level procedure volume outcome data are from the Florida AHCA ambulatory and inpatient discharge data sets 2008-2015 and restrict to physicians performing procedures over the full study period. Vertical integration information is from SK&A. “Vertical” practices report hospital/health system ownership (i.e., hospital-physician integration)\* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

Florida Procedure Data Description. We only include inpatient discharge records that include a primary procedure being performed (i.e., we exclude hospitalizations that do not involve the patient actually receiving a medical procedure during his/her stay). We then treat each discharge record as a unique case performed by the affiliated physician in a given setting (inpatient or outpatient) in a given quarter-year. We use all discharge records from 2008-2015 to assemble annual procedural output measures (combined and by setting) at the physician level. These are then merged with all observed Florida physicians in our primary analytic sample that belong to non-primary care practices at baseline—resulting in just over 5,000 individual physicians spanning the full 2008-2015 period. We apply a version of Equation 1 to this new, combined analytic data set that merely substitutes physician fixed effects for practice fixed effects.