

eAppendix Table 1. Control Variables in Multivariate Models

Variable	N	Mean	Standard Deviation	Source
---- Measures of Market Power ---				
Hospital HHI	411	0.563	0.144	Medicare Claims
Physician HHI	411	0.412	0.0906	Medicare Claims
Measure of vertical integration	411	0.577	0.285	AHA survey and Medicare Claims
Number of insurers ^a	411	3.596	1.589	CCIIO QHP Landscape files
---- Health Plan Characteristics (SLCSP Plan) ---				
Deductible ^b	411	3499	1300	Plan Attributes PUF
Maximum OOP ^b	411	5836	976.0	Plan Attributes PUF
HMO	411	0.504	0.501	Plan Attributes PUF
POS	411	0.0730	0.260	Plan Attributes PUF
PPO	411	0.246	0.431	Plan Attributes PUF
PCP co-pay	411	19.96	16.41	Plan Attributes PUF
PCP co-insurance	411	0.0332	0.0842	Plan Attributes PUF
Specialist co-pay	411	40.84	27.94	Plan Attributes PUF
Specialist co-insurance	411	0.0398	0.0891	Plan Attributes PUF
ED Co-pay	411	205.0	198.3	Plan Attributes PUF
ED Co-insurance	411	0.116	0.127	Plan Attributes PUF
Generic drug co-pay	411	9.791	6.621	Plan Attributes PUF
Generic drug co-insurance	411	0.0148	0.0576	Plan Attributes PUF
New plan indicator	411	0.504	0.501	Plan Attributes PUF
Offers disease management	411	0.839	0.368	Plan Attributes PUF
Specialist referral indicator	411	0.307	0.462	Plan Attributes PUF
HSA eligible	411	0.182	0.387	Plan Attributes PUF
Wellness program	411	0.421	0.494	Plan Attributes PUF
Specialty drug OOP	411	0.0925	0.290	Plan Attributes PUF
No OOP for first PCP visit	411	0.0219	0.147	Plan Attributes PUF
Out of country coverage	411	0.708	0.455	Plan Attributes PUF
Out of service area coverage	411	0.766	0.424	Plan Attributes PUF
National network	411	0.287	0.453	Plan Attributes PUF
Multiple in-network tiers	411	0.0852	0.279	Plan Attributes PUF
---- Geographic Area Characteristics ---				
Median household income 2013, \$	411	45,925	8913	Area Resource File
Total population 2014	411	526,261	884,853	Area Resource File
Fraction with GED to high school	411	0.849	0.0567	Area Resource File
Fraction with college	411	0.220	0.0768	Area Resource File
Fraction poor households	411	0.173	0.0472	Area Resource File
Fraction female	411	0.502	0.0196	Area Resource File

Fraction 15-19 year olds	411	0.0657	0.00888	Area Resource File
Fraction 20-24 year olds	411	0.0730	0.0207	Area Resource File
Fraction 25-44 year olds	411	0.246	0.0255	Area Resource File
Fraction 45-64 year olds	411	0.267	0.0243	Area Resource File
Fraction over 64 year olds	411	0.161	0.0436	Area Resource File
Hospitals per 1000	411	0.0235	0.0204	Area Resource File
Beds per 1000	411	2.640	1.368	Area Resource File
Physicians per 1000	411	1.721	1.089	Area Resource File
Percent Medicare	411	0.192	0.0440	Area Resource File
Percent insured	411	0.820	0.0490	Area Resource File
Physician work in Medicare Geographic Practice Cost Index	411	1.005	0.0428	Centers for Medicare & Medicaid Services
Practice expense in Medicare Geographic Practice Cost Index	411	0.936	0.0520	Centers for Medicare & Medicaid Services
Malpractice expense in Medicare Geographic Practice Cost Index	411	0.949	0.381	Centers for Medicare & Medicaid Services
Number of Medicare physicians per population unit	411	0.0218	0.0148	Medicare Claims
Share PCPs among physicians	411	0.228	0.0222	Medicare Claims
Share specialists among physicians	411	0.242	0.0190	Medicare Claims
Share surgeons among physicians	411	0.155	0.0152	Medicare Claims
Measure of bed capacity ^c	411	6.669	3.016	AHA survey
Measure of for-profit hospitals density ^c	411	0.193	0.214	AHA survey
Measure of not-for-profit hospitals density ^c	411	0.646	0.298	AHA survey
Measure of small-bed hospitals density ^c	411	0.133	0.144	AHA survey
Measure of large-bed hospitals density ^c	411	0.472	0.244	AHA survey
Measure of teaching hospitals density ^c	411	0.260	0.220	AHA survey
Measure of density of hospitals in hospital systems ^c	411	0.686	0.248	AHA survey

AHA indicates American Hospital Association; CCIIO, Center for Consumer Information & Insurance Oversight; GED, General Equivalency Diploma; HHI, Herfindahl-Hirschman Index; HMO, health maintenance organization; HSA, health savings account; OOP, out-of-pocket cost; PCP, primary care physician; POS, point of service; PPO, preferred provider organization; PUF, Public Use Files; QHP, qualified health plan.

^aWe used “issuer names” to construct measures of the number of insurance companies. The following companies entered the count individually: Aetna, Ambetter, Blue Cross Blue Shield and affiliated companies, Humana, United, Avera, Arise, CIGNA, Coventry, Health Alliance, Kaiser Permanente, MedMutal, Pacific Source, Priority, SelectHealth, DAKOTACARE, Unity, IlliniCare, Health First, AultCare. All other issuers were aggregated under “other” insurer.

^bIn-network, for all services if plans have differential deductibles or maximum out of pocket.

^cThese patient weighted density measures are used to characterize geographic markets and are constructed following the method outlined in: Kessler D, McClellan M. Is hospital competition socially wasteful? *Q J Econ.* 2000;115(2):577-615.

eAppendix Table 2. Correlation Across Measures of Market Power

	Hospital HHI	Physician HHI	Vertical Integration
Hospital HHI	1		
Physician HHI	0.573	1	
Vertical integration	0.029	0.119	1

HHI indicates Herfindahl-Hirschman index.

eAppendix Table 3. Differences in Measures of Market Power in Urban Versus Rural Rating Areas

	(1) Mean in Rating Areas With No MSA	(2) Mean in Rating Areas With MSA	(3) <i>P</i> for a 1-sided t-test of H0: (1)>(2)	(4) <i>P</i> for a 2-sided t-test of H0: (1)≠(2)
Hospital HHI	0.63	0.55	0.000	0.000
Physician HHI	0.44	0.41	0.001	0.001
Vertical integration	0.51	0.59	0.987	0.025
Number of rating areas	74	337		

HHI indicates Herfindahl-Hirschman index; MSA, Metropolitan Statistical Area.

eAppendix Table 4. Baseline Regression Specifications for Second-Lowest-Cost Silver Plan (SLCSP) and Lowest-Cost Plan (LCP)

Outcome Variable: Annual Premium	(1)	(2)
	SLCSP Premium	LCP Premium
Hospital HHI	531.5*	487.9*
	(218.0)	(202.4)
Physician HHI	1715.6***	1685.1***
	(421.7)	(374.7)
Vertical integration	87.83	145.5
	(96.45)	(78.50)
Number of insurers	-105.3**	-112.3***
	(34.93)	(28.14)
Deductible	-0.0805*	-0.140
	(0.0310)	(0.0952)
Maximum out-of-pocket amount	0.101	0.889***
	(0.0565)	(0.260)
Plan type: EPO	reference category	
Plan type: HMO	53.59	-248.2
	(156.8)	(195.2)
Plan type: POS	326.7	-23.47
	(225.0)	(205.7)
Plan type: PPO	354.6*	43.34
	(177.1)	(175.4)
Co-pay for a primary care visit	3.866	4.003
	(3.079)	(3.449)
Coinsurance rate for a primary care visit	-744.8	-1046.9
	(806.4)	(802.7)
Co-pay for a specialist visit	-1.223	-1.041
	(3.162)	(2.697)
Coinsurance rate for a specialist visit	1247.2	1112.7
	(907.5)	(626.9)
Co-pay for an ED visit	0.246	0.494
	(0.246)	(0.489)
Coinsurance rate for an ED visit	-322.3	-509.2
	(432.8)	(549.0)
Co-pay amount for a generic drug prescription	0.0524	-17.44*
	(7.179)	(8.776)

Coinsurance rate for a generic drug prescription	-549.4	-1000.4
	(720.9)	(600.7)
New plan	63.37	41.68
	(73.70)	(78.13)
Does the plan offer disease management programs?	57.71	-102.0
	(147.1)	(182.3)
Is a referral required before specialist visit?	196.4	117.8
	(109.3)	(96.33)
Does the plan offer an HSA?	212.3	112.3
	(143.6)	(109.1)
Is the plan for adults only?	-	35.09
	-	(176.7)
Is a wellness program offered?	-54.70	-150.3
	(109.1)	(89.44)
Has maximum coinsurance for specialty drugs?	-353.5*	-273.6
	(150.5)	(205.8)
Are there PCP visits with zero cost sharing?	-60.66	1114.8
	(233.1)	(407.1)
Does the plan offer coverage outside of the United States?	172.4	154.1
	(131.0)	(124.4)
Does the plan offer coverage outside of its service area?	-46.33	-35.20
	(123.3)	(113.6)
Does the plan offer a national network?	163.4	186.6
	(103.2)	(134.0)
Does the plan have multiple in-network tiers?	-241.2*	409.9**
	(114.8)	(135.0)
Median household income 2013	0.00507	0.00496
	(0.0101)	(0.00888)
Total population 2014	0.0000403	0.0000549
	(0.0000486)	(0.0000446)
Percent GED to high school	-50.25	-299.5
	(1046.8)	(1133.2)
Percent college	-154.3	-209.2
	(960.1)	(687.0)
Percent poor households	1183.2	1356.2
	(1581.1)	(1169.5)
Percent female	3272.1	4429.7*
	(3491.8)	(2129.2)
Percent 15-19 year olds	8041.1	2536.7
	(5934.6)	(4772.4)

Percent 20-24 year olds	2968.1	2872.2
	(3062.0)	(2237.5)
Percent 25-44 year olds	6089.0	5375.9
	(4823.4)	(3169.9)
Percent 45-64 year olds	4739.4	2965.7
	(2802.9)	(2295.5)
Percent over 64 years old	3976.9	2224.7
	(4106.4)	(2598.5)
Hospitals per 1000	976.2	-198.4
	(1439.2)	(1028.6)
Beds per 1000	8.792	13.20
	(23.73)	(15.27)
Physicians per 1000	-17.18	-22.79
	(31.59)	(24.24)
Percent Medicare	-612.3	205.9
	(2621.2)	(1542.6)
Percent insured	-1141.6	-946.0
	(1282.9)	(1472.1)
Physician work in Medicare Geographic Practice Cost Ind.	3891.6	2787.8
	(10559.3)	(8059.0)
Practice expense in Medicare Geographic Practice Cost Index	-1927.3	-1309.7
	(1783.0)	(1449.1)
Malpractice cost in Medicare Geographic Practice Cost Index	214.0	203.1
	(229.8)	(190.2)
Number of Medicare physicians per population unit	2083.6	2298.7
	(4282.2)	(4387.5)
Share PCPs among physicians	1558.6	1512.5
	(1713.1)	(1249.2)
Share specialists among physicians	652.1	1335.8
	(2258.6)	(1614.5)
Share surgeons among physicians	1992.7	1997.6
	(1902.8)	(1739.7)
Measure of bed capacity	36.28**	28.84**
	(12.89)	(9.446)
Measure of for-profit hospitals density	150.3	110.3
	(185.0)	(204.7)
Measure of not-for-profit hospitals density	264.0	134.2
	(149.0)	(120.4)
Measure of small-bed hospitals density	257.7	216.4

	(199.7)	(137.3)
Measure of large-bed hospitals density	11.89	43.91
	(117.9)	(92.52)
Measure of teaching hospitals density	-5.613	52.92
	(130.3)	(117.7)
Measure of density of hospitals in hospital systems	126.8	-0.630
	(107.3)	(82.42)
Constant	-3413.2	-7587.4
	(16396.0)	(12153.1)
State Fixed Effects	Yes	Yes
R-squared	0.828	0.829
N	411	411
Y mean	4718.0	3650.9
Y standard deviation	784.2	655.8

ED indicates emergency department; GED, General Equivalency Diploma; HHI, Herfindahl-Hirschman Index; HMO, health maintenance organization; HSA, health savings account; OOP, out-of-pocket cost; PCP, primary care physician; POS, point of service; PPO, preferred provider organization;.

Standard errors in parentheses, clustered at plan level: * $P < .05$; ** $P < .01$; *** $P < .001$

eAppendix Table 5. Sensitivity Analysis to Alternative Specifications (SLCSP)^a

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Unbundled VI Measure	Rating Areas with MSA	Rating Areas with no MSA	Including State-Based Marketplaces	Average Premium	Baseline with no State FE	Baseline with Population Weights	Only States with County-Level Rating Areas
Hospital HHI	507.0*	707.9**	1782.3	446.4*	655.4**	667.3	571.1*	1133.3**
	(216.4)	(243.3)	(3121.7)	(203.3)	(229.9)	(361.9)	(243.2)	(400.6)
Physician HHI	1769.5***	1630.0***	3227.7	2117.2***	1490.0**	1158.7	1528.3**	1966.6
	(426.1)	(467.3)	(3731.9)	(408.1)	(476.2)	(670.4)	(546.1)	(1190.7)
Vertical Integration		129.7	-247.7	73.64	188.7*	-2.907	118.4	-173.9
		(110.2)	(1297.0)	(88.43)	(91.77)	(119.6)	(115.3)	(207.6)
Number of Insurers	-105.2**	-79.45*	-0.913	-116.8***	-166.7***	-68.25*	-55.21	-37.9
	(34.76)	(34.41)	(782.2)	(31.66)	(31.81)	(27.15)	(33.60)	(46.2)
Fully Integrated	88.76							
	(102.0)							

Closed physician-hospital org.	260.3							
	(261.4)							
Open physician-hospital org.	16.26							
	(174.6)							
Independent practice association	239.5							
	(319.2)							
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
R-squared	0.829	0.834	0.99	0.818	0.795	0.523	0.874	0.819
N	411	337	74	482	411	411	411	113
Y Mean	4718	4641.3	5067.2	4708.1	4718	4718	4443.2	4910.2
Y Std. Dev.	784.2	734.9	904.1	817.3	784.2	784.2	729.5	495.3

FE indicates fixed effects; HHI, Herfindahl-Hirschman Index; MSA, Metropolitan Statistical Area; org, organization; SLCSF, second-lowest-cost Silver plan; VI, vertical integration.

^aStandard errors in parentheses, clustered at plan level: * $P < .05$; ** $P < .01$; *** $P < .001$. The regressions include, but do not report the same (unless otherwise specified in the column title) set of control variables for characteristics of plans and geographic areas as the baseline specification in eAppendix Table 4.