**Appendix**

We investigated several facets of our results to assess the validity and generalizability of our findings related to changes in shared patients between hospitals. As a first step, we assessed whether the hospitals included in our sample, which made up the majority of non-federal, acute care hospitals were similar to the hospitals not included in our sample. We found that these groups had some differences. Relative to hospitals present in the baseline year but omitted from the panel, hospitals included in our analytic sample were more likely to be major teaching hospitals, have over 400 beds, to be not-for-profit, to be members of a multihospital network, and to have a larger market share (Appendix Table 1). Second, to provide greater transparency in our results, we present the full results of our fixed effects regression model in Appendix Table 2.

**Appendix Table 1. Comparison of Hospitals in Panel and Omitted from Panel on Key Hospital Characteristics**

| | **Not in Panel (n=400)** | | **Included in Panel (n=4,312)** | | **p-value** |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Major Teaching Hospital | 2% | 14% | 6% | 24% | 0.0004 |
| Minor Teaching Hospital | 9% | 29% | 12% | 32% | 0.1542 |
| Small Hospital (<100 Beds) | 63% | 48% | 49% | 50% | <0.0001 |
| Medium Hospital (100-399 Beds) | 34% | 47% | 41% | 49% | 0.0082 |
| Large Hospital (400+ Beds) | 3% | 17% | 10% | 30% | <0.0001 |
| Not For Profit | 41% | 49% | 60% | 49% | <0.0001 |
| For Profit | 36% | 48% | 17% | 37% | <0.0001 |
| Government | 23% | 42% | 23% | 42% | 0.9980 |
| System Member | 53% | 50% | 55% | 50% | 0.3552 |
| Network Member | 19% | 39% | 32% | 47% | <0.0001 |
| General Acute Care Hospital | 93% | 26% | 97% | 16% | 0.0037 |
| Market Share | 0.10 | 0.16 | 0.14 | 0.17 | <0.0001 |
| Market Concentration (HHI) | 0.19 | 0.12 | 0.20 | 0.13 | 0.2085 |

**Appendix Table 2. Full Regression Results for Main Fixed Effect Regressions Predicting Medicare Patients Shared by Hospitals After Joining an ACO.**

| VARIABLES | (1) Total Log-Volume Shared Patients | (2) Log-Volume Shared Patients--Close Partners | (3) Log-Volume Shared Patients—Peripheral Partners |
|---|---|---|---|
| ACO | 0.0436*** | 0.0463*** | 0.00844 |
| | (0.0125) | (0.0122) | (0.0174) |
| **Year Fixed Effects** | | | |
| 2011 (Omitted: 2010) | 0.0732*** | 0.0683*** | 0.0876*** |
| | (0.00418) | (0.00407) | (0.00888) |
| 2012 | 0.125*** | 0.118*** | 0.164*** |
| | (0.00661) | (0.00648) | (0.0132) |
| 2013 | 0.146*** | 0.136*** | 0.195*** |
| | (0.00906) | (0.00879) | (0.0174) |
| 2014 | 0.179*** | 0.170*** | 0.244*** |
| | (0.0123) | (0.0118) | (0.0228) |
| **Ownership Status** | | | |
| For Profit (Omitted: Not For Profit) | -0.0317 | -0.0294 | -0.0513 |
| | (0.0315) | (0.0289) | (0.0493) |
| Government | 0.149** | 0.139** | 0.136 |
| | (0.0724) | (0.0665) | (0.0892) |
| **Size** | | | |
| Medium (Omitted: Small) | 0.00258 | 0.00565 | -0.0226 |
| | (0.0154) | (0.0152) | (0.0286) |
| Large | 0.0223 | 0.0215 | 0.00390 |
| | (0.0265) | (0.0261) | (0.0422) |
| **Teaching Status** | | | |
| Major Teaching (Omitted: Not teaching) | -0.0319 | -0.00828 | -0.0534 |
| | (0.0274) | (0.0311) | (0.0367) |
| Minor Teaching | 0.00585 | 0.00418 | 0.0162 |
| | (0.0117) | (0.0113) | (0.0170) |
| System Member | -0.0197 | -0.0185 | -0.0308 |
| | (0.0158) | (0.0151) | (0.0228) |
| Network Member | 0.00793 | 0.0106 | -0.0162 |
| | (0.0110) | (0.0103) | (0.0145) |
| General Acute Care | -0.000176 | -0.00830 | 0.0324 |
| | (0.0416) | (0.0406) | (0.0786) |
| System Market Share | 0.0928 | 0.0749 | 0.186** |
| | (0.0696) | (0.0684) | (0.0870) |
| Herfindahl Index (Competition) | -0.0655 | -0.0434 | -0.115 |
| | (0.0680) | (0.0663) | (0.118) |
| Case Mix Index | 0.0265 | 0.0299 | -0.0581 |
| | (0.0438) | (0.0417) | (0.0797) |
| **County Demographics** | | | 1.08e-06 |

| | | | |
|---|---|---|---|
| Income Per Capita in Thousands | -0.00076 | -0.00077 | (0.0014) |
| | (0.00639) | (0.00063) | 0.00132*** |
| Unemployment Rate | 0.00106*** | 0.00113*** | 0.00112*** |
| | (0.000264) | (0.000254) | (0.000421) |
| PCPs per 1,000 persons | 0.0478* | 0.0462* | 0.0366 |
| | (0.0251) | (0.0252) | (0.0552) |
| Physicians per 1,000 persons | 0.00452 | 0.00619 | 0.00267 |
| | (0.00581) | (0.00575) | (0.0111) |
| Proportion Female | 0.317** | 0.314** | 0.239 |
| | (0.145) | (0.140) | (0.267) |
| Population Density | -0.000364* | -0.000876*** | -0.000274 |
| | (0.000209) | (0.000164) | (0.000394) |
| Proportion Over 65 | 0.983** | 1.019** | 1.369 |
| | (0.436) | (0.416) | (0.893) |
| Constant | 7.543*** | 7.309*** | 5.811*** |
| | (0.140) | (0.134) | (0.251) |
| Observations | 21,560 | 21,560 | 20,542 |
| R-squared | 0.139 | 0.129 | 0.080 |
| Number of Hospitals | 4,312 | 4,312 | 4,233 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We tested the robustness of our findings by relaxing five key assumptions. First, our main analyses use all hospitals present in the balanced panel; however, among this sample, hospitals that eventually joined an ACO and hospitals that never joined one were different across several observable characteristics, such that these differences may lead to non-parallel trends in patient sharing over time. To better understand the impact of these observable differences on our outcome, we repeated our initial analysis using a matched sample of hospitals that eventually and never joined an ACO. Specifically, we matched hospitals by their predicted likelihood to eventually join an ACO based on their volume of shared patients, observable hospital characteristics and observable county characteristics in 2010. This resulted in a sample of 900 total hospitals, 450 of which eventually joined an ACO and 450 of which were matched controls. As shown in Table 3, this resulted in a panel of cases and controls that were well matched on observable characteristics. We then repeated our initial fixed effects regression (Table XX). Results of this analysis were consistent with our main results.

Second, hospital shared patient volume is not completely independent of their partners shared patient volume—instead, when one hospital's shared patient volume increases, so must the volume of its partners. To address the potential that standard errors in our initial model did not account for this correlation, we repeated our initial analysis by clustering standard errors at the Hospital Referral Region level. We chose to use HRRs because they are a common method to identify groups of hospitals and are defined by referral patterns between hospitals. They are therefore a reasonable definition of hospitals whose shared patient patterns may be inter-related. Results and statistical significance were essentially unchanged by altering the level of clustering in these model (Appendix Table 5)

Third, we redefined close partners as the six highest volume partners for each hospital and all other partners as peripheral. We chose six partners because it resulted in a division of patients into close partners and peripheral partners that was proportional to our main method: patients shared through close partners accounted for 83% of all shared patients for the median hospital compared to 80% in our primary approach. We also defined four levels of hospital relationship based on the proportion of each hospital's shared patients shared with each partner: very close (relationships making up 4.84%-100% of the hospital's total shared patient volume (equivalent to the $75^{th}$-$100^{th}$ percentile of shared patient proportion), moderately close [1.42-4.84% ($50^{th}$-$75^{th}$ percentile)], peripheral (0.43%-1.42% [$25^{th}$-$50^{th}$ percentile], and very peripheral [0.006% to 0.43% (0-$25^{th}$ percentile)]. We then repeated our regression model using the log of each of these measures as outcomes and report these results in Appendix Table 6. We found that our analyses were robust to alternative definitions of hospital relationships: there was an effect of ACO participation on greater increase in patient sharing among the six largest partner for each hospital but not the others (eTable 3). We also identified an effect for very close hospitals but not moderately close, moderately peripheral or very peripheral hospitals.

Next, we identified all models in which hospitals were dropped due to having no shared patients captured through that type of relationship and encoded 10—1 below the number required for inclusion in the data set—for all hospitals missing data. We then replicated each model including all hospitals. we observed a trend towards significance among several peripheral relationship volume variables, and especially among very peripheral relationships and report these results on Appendix Table 7. We believe that this may indicate that ACO membership is associated with the establishment of some peripheral relationships, though not the further strengthening of these relationships. This would explain why encoding missing data would allow

for identification of an effect: it allows for identification of the movement from very low values to slightly higher values, which might be obscured if these very low values are simply dropped. However, we view this as conjectural since we cannot be sure how many patients these hospitals shared with very peripheral partners when data is missing, if any.

Finally, we divided hospital relationships into three categories by multi-hospital system membership: relationships between hospitals in the same system, between hospitals not in the same system but for which the focal hospital did belong to a multihospital system, and between hospitals not in the same system because the focal hospital did not belong to a system. We replicated our models estimating the volume of patients shared with all, close and peripheral hospitals for all three types of system relationships. We observed a stronger association among same-system hospitals than other hospitals, though there were some statistically significant and trending results among non-system hospitals (Appendix Tables 8 and 9). This follows from the sense that there are relatively few barriers to patient sharing among same-system hospitals, such that the appeal of focusing sharing in those hospitals is high and the incentives not to share is very low.

**Appendix Table 3. Comparison of ACO Hospitals and Matched and Unmatched Pairs**

| | Matched Never ACO (n=450) | | Eventual ACO (n=450) | | p-value | Unmatched Never ACO (n=3,412) | |
|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | Mean | SD |
| Total Patients | 7897 | 8544 | 8279 | 8273 | 0.5 | 4591 | 6707 |
| Major Teaching Hospital | 9.3% | 29.1% | 13.1% | 33.8% | 0.073 | 5.1% | 21.9% |
| Minor Teaching Hospital | 21.1% | 40.9% | 19.6% | 39.7% | 0.56 | 9.3% | 29.1% |
| Small Hospital (<100 Beds) | 27.6% | 44.7% | 27.3% | 44.6% | 0.94 | 55.1% | 49.7% |
| Medium Hospital (100-399 Beds) | 55.1% | 49.8% | 53.6% | 49.9% | 0.64 | 36.9% | 48.3% |
| Large Hospital (400+ Beds) | 17.3% | 37.9% | 19.1% | 39.4% | 0.49 | 8.0% | 27.2% |
| Not For Profit | 85.3% | 35.4% | 84.4% | 36.3% | 0.071 | 53.8% | 49.9% |
| For Profit | 7.3% | 26.1% | 7.3% | 26.1% | 1 | 19.2% | 39.4% |
| Government | 7.3% | 26.1% | 8.2% | 27.5% | 0.62 | 27.0% | 44.4% |
| System Member | 77.8% | 41.6% | 76.9% | 42.2% | 0.75 | 49.6% | 50.0% |
| Network Member | 44.0% | 49.7% | 43.3% | 49.6% | 0.84 | 29.0% | 45.4% |
| General Acute Care Hospital | 100% | 0.0% | 99.3% | 8.1% | 0.08 | 96.8% | 17.6% |
| Market Share | 0.21 | 0.18 | 0.21 | 0.18 | 0.91 | 0.13 | 0.16 |
| Market Concentration (HHI) | 0.20 | 0.13 | 0.20 | 0.14 | 0.92 | 0.20 | 0.13 |
| Income Per Capita in Thousands | 39759 | 9565 | 40158 | 9245 | 0.52 | 36279 | 9267 |
| Unemployment Rate | 90.88 | 24.55 | 92.50 | 22.30 | 0.3 | 93.71 | 29.74 |
| PCPs per 1,000 persons | 0.80 | 0.36 | 0.79 | 0.36 | 0.41 | 0.66 | 0.30 |
| Physicians per 1,000 persons | 2.89 | 2.69 | 2.85 | 2.28 | 0.84 | 1.91 | 1.83 |
| Proportion Female | 0.49 | 0.03 | 0.49 | 0.03 | 0.53 | 0.49 | 0.03 |
| Population Density | 11.01 | 23.57 | 15.47 | 37.02 | 0.03 | 6.88 | 30.92 |
| Proportion Over 65 | 0.13 | 0.03 | 0.13 | 0.03 | 0.93 | 0.15 | 0.04 |

p-value reported is the result of a test comparing the matched pairs to eventual ACO members.

**Appendix Table 4. Matched Sample of Hospitals that Eventually and Never Join an ACO**

| VARIABLES | (1) Log-Volume Shared Patients—Top 6 Relationships | (2) Log-Volume Shared Patients—Close Relationships | (3) Log-Volume Shared Patients—Peripheral Relationships |
|---|---|---|---|
| ACO | 0.034*** | 0.033*** | 0.013 |
| | (0.013) | (0.013) | (0.020) |
| Observations | 4,500 | 4,500 | 4,500 |

900 hospitals represented in 450 hospital-year observations. Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Appendix Table 5. Fixed Effects Results Using Clustered Standard Errors**

| VARIABLES | (1) Total Log-Volume Shared Patients | (2) Log-Volume Shared Patients--Close Partners | (3) Log-Volume Shared Patients—Peripheral Partners |
|---|---|---|---|
| ACO | 0.0436*** | 0.0463*** | 0.00844 |
| | (0.0125) | (0.0122) | (0.0174) |
| Observations | 21,560 | 21,560 | 19,317 |

4,312 hospitals represented in 21,560 hospital-year observations.
For hospitals that did not share patients for each relationship type, a value of 10 (1 below the cutoff for inclusion in the data set) was encoded prior to log-transformation.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Appendix Table 6. Regression Results for Alternate Specification of Partner Strength for Fixed Effect Regressions Predicting Medicare Patients Shared by Hospitals After Joining an ACO.**

| VARIABLES | (1) Log-Volume Shared Patients—Top 6 Relationships | (2) Log-Volume Shared Patients—All Other Relationships | (3) Log-Volume Shared Patients—Very Close Relationships | (4) Log-Volume Shared Patients—Close Relationships | (5) Log-Volume Shared Patients—Peripheral Relationships | (6) Log-Volume Shared Patients—Very Peripheral Relationships |
|---|---|---|---|---|---|---|
| ACO | 0.043*** | 0.022 | 0.046*** | 0.002 | 0.021 | 0.033** |
| | (0.012) | (0.017) | (0.0122) | (0.018) | (0.020) | (0.027) |
| Observations | 21,560 | 19,317 | 21,560 | 20,316 | 17,457 | 11,298 |

4,312 hospitals represented in 21,560 hospital-year observations. For hospitals that did not share patients for each relationship type, a value of 10 (1 below the cutoff for inclusion in the data set) was encoded prior to log-transformation.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Appendix Table 7. Fixed Effects Models After Encoding Shared Patient Values.**

| VARIABLES | (1) Log-Volume Shared Patients—Peripheral Relationships | (2) Log-Volume Shared Patients—Below Top 6 Relationships | (3) Log-Volume Shared Patients—Moderately Close Relationships | (4) Log-Volume Shared Patients—Moderately Peripheral Relationships | (5) Log-Volume Shared Patients—Very Peripheral Relationships |
|---|---|---|---|---|---|
| ACO | 0.0274 | 0.0352* | 0.0305 | 0.0386* | 0.104*** |
| | (0.0196) | (0.0184) | (0.0232) | (0.0224) | (0.0245) |
| **Year Fixed Effects** | | | | | |
| 2011 (Omitted: 2010) | 0.0900*** | 0.103*** | 0.0764*** | 0.105*** | 0.0807*** |
| | (0.00915) | (0.00760) | (0.0102) | (0.0104) | (0.00889) |
| 2012 | 0.162*** | 0.174*** | 0.143*** | 0.155*** | 0.151*** |
| | (0.0138) | (0.0119) | (0.0153) | (0.0159) | (0.0122) |
| 2013 | 0.192*** | 0.194*** | 0.174*** | 0.178*** | 0.170*** |
| | (0.0182) | (0.0161) | (0.0200) | (0.0209) | (0.0149) |
| 2014 | 0.231*** | 0.230*** | 0.212*** | 0.209*** | 0.206*** |
| | (0.0244) | (0.0215) | (0.0268) | (0.0269) | (0.0189) |
| **Ownership Status** | | | | | |
| Not-For-Profit (Omitted: For-Profit) | -0.0497 | -0.00809 | -0.0394 | -0.0902 | -0.0358 |
| | (0.0634) | (0.0626) | (0.0649) | (0.0618) | (0.0490) |
| Government | 0.166 | 0.211* | 0.135 | 0.171 | 0.129 |
| | (0.112) | (0.109) | (0.109) | (0.111) | (0.0822) |
| **Size** | | | | | |
| Medium (Omitted: Small) | -0.0447 | 0.00956 | -0.0527 | -0.0209 | 0.0240 |
| | (0.0308) | (0.0276) | (0.0358) | (0.0461) | (0.0334) |
| Large | -0.0222 | 0.0346 | -0.00853 | -0.0544 | 0.0506 |
| | (0.0436) | (0.0385) | (0.0481) | (0.0634) | (0.0546) |
| **Teaching Status** | | | | | |
| Major Teaching (Omitted: None) | -0.0455 | -0.0309 | -0.0354 | -0.0996* | 0.0466 |
| | (0.0378) | (0.0349) | (0.0454) | (0.0589) | (0.0793) |
| Minor Teaching | 0.0254 | 0.0255 | 0.0127 | 0.0274 | 0.0551** |
| | (0.0197) | (0.0182) | (0.0253) | (0.0217) | (0.0268) |
| System Member | -0.0458 | -0.0188 | -0.0524* | -0.00956 | 0.0187 |
| | (0.0285) | (0.0286) | (0.0309) | (0.0289) | (0.0238) |
| Network Member | -0.0262 | -0.00650 | -0.0310 | -0.00292 | -0.00979 |
| | (0.0184) | (0.0165) | (0.0198) | (0.0203) | (0.0164) |
| General Acute Care | 0.0374 | -0.0109 | 0.0433 | -0.0725 | -0.00159 |
| | (0.0741) | (0.0618) | (0.0705) | (0.0563) | (0.0521) |
| System Market Share | 0.322*** | 0.113 | 0.343*** | 0.207* | 0.231** |
| | (0.117) | (0.104) | (0.125) | (0.117) | (0.101) |
| Herfindahl Index (Competition) | -0.120 | -0.108 | -0.0873 | -0.222 | -0.250** |
| | (0.133) | (0.0992) | (0.155) | (0.147) | (0.120) |
| Case Mix Index | -0.0437 | -0.0355 | -0.0580 | 0.111* | 0.183*** |
| | (0.0808) | (0.0926) | (0.0774) | (0.0655) | (0.0536) |
| **County Demographics** | | | | | |
| Income Per Capita in Thousands | 0.00098 | 0.00045 | 0.0016 | -0.0022 | -0.0012 |
| | (0.0015) | (0.0011) | (0.0016) | (0.0014) | (0.00095) |
| Unemployment Rate | 0.000899** | 0.000802* | 0.00103** | -0.000184 | 0.00132*** |
| | (0.000455) | (0.000426) | (0.000516) | (0.000549) | (0.000463) |
| PCPs per 1,000 persons | 0.0442 | 0.0678 | 0.0729 | -0.0305 | 0.120*** |
| | (0.0537) | (0.0441) | (0.0574) | (0.0474) | (0.0414) |
| Physicians per 1,000 persons | 0.00341 | 0.00198 | 0.00403 | 0.00603 | -0.00590 |

| | | | | | |
|---|---|---|---|---|---|
| | (0.0123) | (0.00932) | (0.0131) | (0.0101) | (0.0165) |
| Proportion Female | 0.273 | 0.406* | 0.164 | 0.930*** | 0.385 |
| | (0.268) | (0.244) | (0.283) | (0.304) | (0.265) |
| Population Density | -0.000218 | -0.000143 | -0.000195 | 0.000578 | -0.000342 |
| | (0.000456) | (0.000350) | (0.000422) | (0.000751) | (0.000372) |
| Proportion Over 65 | 0.942 | 1.031 | 0.801 | 1.085 | 1.103 |
| | (0.928) | (0.742) | (0.983) | (1.100) | (0.671) |
| Constant | 5.670*** | 5.303*** | 5.405*** | 3.941*** | 2.559*** |
| | (0.252) | (0.229) | (0.261) | (0.284) | (0.213) |
| Observations | 21,560 | 21,560 | 21,560 | 21,560 | 21,560 |
| R-squared | 0.066 | 0.086 | 0.041 | 0.053 | 0.053 |
| Number of Hospitals | 4,312 | 4,312 | 4,312 | 4,312 | 4,312 |

**Appendix Table 8. Fixed Effects Models For Patients Shared Inside and Outside Multihospital ACOs.**

| VARIABLES | (1) Same ACO—All Patients | (2) Same ACO—Close Partners | (3) Same ACO—Peripheral Partners | (4) Not Same ACO—All Patients | (5) Not Same ACO—Close Patients | (6) Not Same ACO—Peripheral Patients |
|---|---|---|---|---|---|---|
| ACO | -0.00693 | -0.00315 | 0.0660 | 0.0285** | 0.0271** | -0.00416 |
| | (0.0237) | (0.0229) | (0.0418) | (0.0126) | (0.0136) | (0.0162) |
| **Year Fixed Effects** | | | | | | |
| 2011 (Omitted: 2010) | 0.142*** | 0.119*** | 0.154*** | 0.0764*** | 0.0708*** | 0.0892*** |
| | (0.0244) | (0.0245) | (0.0443) | (0.00354) | (0.00347) | (0.00766) |
| 2012 | 0.255*** | 0.231*** | 0.172** | 0.128*** | 0.120*** | 0.166*** |
| | (0.0418) | (0.0433) | (0.0872) | (0.00651) | (0.00643) | (0.0127) |
| 2013 | 0.337*** | 0.297*** | 0.277** | 0.147*** | 0.138*** | 0.197*** |
| | (0.0589) | (0.0603) | (0.120) | (0.00911) | (0.00889) | (0.0171) |
| 2014 | 0.385*** | 0.357*** | 0.345** | 0.180*** | 0.172*** | 0.246*** |
| | (0.0813) | (0.0809) | (0.175) | (0.0124) | (0.0120) | (0.0228) |
| **Ownership Status** | | | | | | |
| Not-For-Profit (Omitted: For-Profit) | -0.333 | -0.352 | -0.0478 | -0.0292 | -0.0270 | -0.0413 |
| | (0.225) | (0.248) | (0.229) | (0.0309) | (0.0279) | (0.0476) |
| Government | 0.271 | 0.318 | 0.835** | 0.140** | 0.127** | 0.0902 |
| | (0.395) | (0.460) | (0.413) | (0.0707) | (0.0627) | (0.0799) |
| **Size** | | | | | | |
| Medium (Omitted: Small) | 0.0795 | 0.0659 | 0.0982 | 0.00255 | 0.00492 | -0.0239 |
| | (0.0971) | (0.104) | (0.0851) | (0.0153) | (0.0156) | (0.0289) |
| Large | 0.231* | 0.238* | 0.292 | 0.0226 | 0.0192 | 0.00283 |
| | (0.121) | (0.129) | (0.206) | (0.0264) | (0.0263) | (0.0422) |
| **Teaching Status** | | | | | | |
| Major Teaching (Omitted: None) | -0.153** | -0.0824 | -0.192 | -0.0286 | -0.00158 | -0.0468 |
| | (0.0743) | (0.0864) | (0.172) | (0.0271) | (0.0312) | (0.0371) |
| Minor Teaching | -0.0669* | -0.0671* | -0.0238 | 0.00832 | 0.00732 | 0.0176 |
| | (0.0343) | (0.0404) | (0.0635) | (0.0117) | (0.0113) | (0.0172) |
| System Member | 0.0308 | 0.0461 | -0.0571 | -0.0224 | -0.0241 | -0.0295 |
| | (0.0815) | (0.107) | (0.104) | (0.0159) | (0.0153) | (0.0228) |
| Network Member | 0.0396 | 0.0538 | -0.0186 | 0.00751 | 0.0102 | -0.0160 |
| | (0.0339) | (0.0422) | (0.0560) | (0.0110) | (0.0104) | (0.0145) |
| General Acute Care | 0.230* | 0.226* | | -0.00123 | -0.01000 | 0.0359 |
| | (0.121) | (0.116) | | (0.0416) | (0.0406) | (0.0785) |
| System Market Share | 0.141 | 0.0553 | 0.428 | 0.0990 | 0.0856 | 0.184** |
| | (0.206) | (0.223) | (0.376) | (0.0697) | (0.0686) | (0.0869) |
| Herfindahl Index (Competition) | -0.425 | -0.171 | -0.334 | -0.0638 | -0.0248 | -0.106 |
| | (0.299) | (0.307) | (0.649) | (0.0684) | (0.0671) | (0.117) |
| Case Mix Index | -0.0459 | -0.0392 | -0.108 | 0.0323 | 0.0336 | -0.0589 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.149) | (0.176) | (0.258) | (0.0441) | (0.0422) | (0.0799) |
| **County Demographics** | | | | | | |
| Income Per Capita in Thousands | 4.88e-06 | 4.97e-06 | 2.43e-06 | -8.82e-07 | -9.86e-07 | 1.10e-06 |
| | (4.37e-06) | (5.35e-06) | (7.45e-06) | (6.38e-07) | (6.34e-07) | (1.43e-06) |
| Unemployment Rate | -0.000358 | 0.000558 | 0.00463* | 0.00104*** | 0.00113*** | 0.00133*** |
| | (0.00181) | (0.00184) | (0.00271) | (0.000258) | (0.000249) | (0.000410) |
| PCPs per 1,000 persons | 0.0676 | 0.0641 | -0.576 | 0.0527** | 0.0508* | 0.0452 |
| | (0.0952) | (0.0977) | (0.360) | (0.0259) | (0.0264) | (0.0554) |
| Physicians per 1,000 persons | -0.0234 | -0.0356 | 0.00810 | 0.00448 | 0.00706 | 0.00380 |
| | (0.0544) | (0.0617) | (0.0502) | (0.00589) | (0.00621) | (0.0117) |
| Proportion Female | -0.0356*** | -0.0489*** | 0.0136 | -0.000276 | -0.000736*** | -0.000237 |
| | (0.0109) | (0.0158) | (0.0247) | (0.000255) | (0.000239) | (0.000415) |
| Population Density | -3.085 | -1.749 | 2.668 | 1.092** | 1.106*** | 1.390 |
| | (3.348) | (3.395) | (6.387) | (0.447) | (0.426) | (0.895) |
| Proportion Over 65 | | | - | | | |
| Constant | 7.990*** | 8.131*** | 4.467*** | 7.637*** | 7.395*** | 5.902*** |
| | (0.721) | (0.824) | (1.404) | (0.116) | (0.111) | (0.211) |
| Observations | 2,083 | 1,749 | 1,436 | 21,560 | 21,536 | 20,535 |
| R-squared | 0.205 | 0.211 | 0.113 | 0.134 | 0.119 | 0.079 |
| Number of npi1 | 422 | 366 | 318 | 4,312 | 4,310 | 4,232 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Appendix Table 9. Fixed Effects Models For Hospitals in Multihospital Systems.**

| VARIABLES | (1) Same System—All Patients | (2) Same System—Close Partners | (3) Same System—Peripheral Partners | (4) Not Same System—All Patients | (5) Not Same System—Close Patients | (6) Not Same System—Peripheral Patients |
|---|---|---|---|---|---|---|
| ACO | 0.0805*** | 0.0409* | 0.0654* | 0.0271* | 0.0289* | -0.00909 |
| | (0.0275) | (0.0219) | (0.0386) | (0.0148) | (0.0152) | (0.0190) |
| **Year Fixed Effects** | | | | | | |
| 2011 (Omitted: 2010) | 0.129*** | 0.107*** | 0.127*** | 0.0833*** | 0.0658*** | 0.102*** |
| | (0.0148) | (0.0126) | (0.0234) | (0.00697) | (0.00721) | (0.0121) |
| 2012 | 0.222*** | 0.203*** | 0.216*** | 0.129*** | 0.104*** | 0.175*** |
| | (0.0214) | (0.0180) | (0.0380) | (0.00968) | (0.0106) | (0.0168) |
| 2013 | 0.292*** | 0.267*** | 0.290*** | 0.146*** | 0.115*** | 0.205*** |
| | (0.0280) | (0.0233) | (0.0524) | (0.0131) | (0.0139) | (0.0215) |
| 2014 | 0.422*** | 0.383*** | 0.410*** | 0.152*** | 0.111*** | 0.248*** |
| | (0.0364) | (0.0301) | (0.0695) | (0.0180) | (0.0190) | (0.0285) |
| **Ownership Status** | | | | | | |
| Not-For-Profit (Omitted: For-Profit) | -0.0720 | -0.0440 | -0.109 | -0.0591 | -0.0577 | 0.0285 |
| | (0.103) | (0.0627) | (0.178) | (0.0364) | (0.0399) | (0.0529) |
| Government | 0.353** | 0.214 | 0.247 | 0.160* | 0.145* | 0.274*** |
| | (0.168) | (0.166) | (0.200) | (0.0859) | (0.0817) | (0.0974) |
| **Size** | | | | | | |
| Medium (Omitted: Small) | 0.0167 | 0.0304 | -0.0513 | 0.0119 | 0.0301 | -0.0230 |
| | (0.0383) | (0.0389) | (0.0621) | (0.0188) | (0.0221) | (0.0316) |
| Large | 0.0274 | 0.0264 | -0.0884 | 0.0725*** | 0.0713** | 0.0508 |
| | (0.0596) | (0.0511) | (0.101) | (0.0262) | (0.0306) | (0.0431) |
| **Teaching Status** | | | | | | |
| Major Teaching (Omitted: None) | -0.0727 | 0.0421 | -0.114 | -0.0398 | -0.0161 | -0.0724 |
| | (0.0562) | (0.0625) | (0.101) | (0.0321) | (0.0447) | (0.0474) |
| Minor Teaching | 0.00894 | 0.00721 | 0.0526 | -0.00641 | -0.00400 | -0.00100 |
| | (0.0242) | (0.0228) | (0.0494) | (0.0151) | (0.0156) | (0.0216) |
| Network Member | -0.00545 | 0.00695 | -0.0330 | 0.0178 | 0.0188 | -0.0114 |
| | (0.0249) | (0.0203) | (0.0330) | (0.0141) | (0.0141) | (0.0173) |
| General Acute Care | 0.154* | 0.122 | 0.102 | 0.0485 | 0.0309 | 0.116 |
| | (0.0823) | (0.0899) | (0.0859) | (0.0419) | (0.0421) | (0.0890) |
| System Market Share | 1.564*** | 0.964*** | 0.461 | -0.743*** | -0.830*** | -0.0119 |
| | (0.248) | (0.231) | (0.337) | (0.125) | (0.115) | (0.130) |
| Herfindahl Index (Competition) | -0.207 | 0.0260 | -0.472 | 0.0600 | 0.105 | -0.114 |
| | (0.254) | (0.226) | (0.349) | (0.106) | (0.119) | (0.143) |
| Case Mix Index | -0.0243 | -0.0303 | 0.0387 | 0.0172 | 0.0281 | -0.00259 |
| | (0.0860) | (0.0779) | (0.144) | (0.0427) | (0.0442) | (0.0703) |
| **County Demographics** | | | | | | |
| Income Per Capita in Thousands | -0.0050** | -0.0035 | 0.0036 | -0.0004 | 0.00006 | 0.0011 |
| | (0.0025) | (0.0021) | (0.0039) | (0.0013) | (0.001) | (0.0019) |
| Unemployment Rate | 0.000988 | 0.00193*** | 0.00385*** | 0.00104*** | 0.000912** | 0.00153*** |
| | (0.000751) | (0.000648) | (0.00143) | (0.000396) | (0.000409) | (0.000549) |
| PCPs per 1,000 persons | 0.117* | -0.0278 | 0.193 | 0.00374 | -0.0330 | 0.159** |
| | (0.0636) | (0.0829) | (0.144) | (0.0315) | (0.0335) | (0.0641) |
| Physicians per 1,000 persons | -0.0120 | 0.0639* | -0.0147 | 0.00221 | 0.00672 | -0.0184 |
| | (0.0122) | (0.0347) | (0.0145) | (0.00644) | (0.00770) | (0.0117) |
| Proportion Female | -0.618 | -0.226 | -0.449 | -0.0932 | 0.0633 | -0.210 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.434) | (0.424) | (0.546) | (0.223) | (0.217) | (0.349) |
| Population Density | 0.000179 | -0.00114 | -0.000323 | -0.000179 | -0.00213*** | 0.000216 |
| | (0.000607) | (0.000705) | (0.000547) | (0.000215) | (0.000332) | (0.000328) |
| Proportion Over 65 | -0.187 | -0.269 | 0.565 | 1.245** | 1.346** | 1.341 |
| | (0.971) | (0.827) | (3.306) | (0.596) | (0.615) | (1.062) |
| Constant | 6.537*** | 6.578*** | 4.249*** | 7.720*** | 7.343*** | 5.916*** |
| | (0.378) | (0.328) | (0.675) | (0.185) | (0.186) | (0.304) |
| Observations | 10,324 | 8,633 | 6,756 | 12,433 | 12,287 | 12,075 |
| R-squared | 0.167 | 0.170 | 0.077 | 0.129 | 0.091 | 0.087 |
| Number of Hospitals | 2,302 | 1,969 | 1,739 | 2,689 | 2,675 | 2,654 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Appendix Table 10. Fixed Effects Models For Hospitals Not in Multihospital Systems.**

| | (1) | (2) | (3) |
|---|---|---|---|
| | All Patients | Close Partners | Peripheral Partners |
| VARIABLES | | | |
| ACO | 0.0319** | 0.0259 | 0.0227 |
| | (0.0150) | (0.0159) | (0.0287) |
| **Year Fixed Effects** | | | |
| 2011 (Omitted: 2010) | 0.0536*** | 0.0506*** | 0.0612*** |
| | (0.00447) | (0.00441) | (0.0132) |
| 2012 | 0.0948*** | 0.0895*** | 0.128*** |
| | (0.00824) | (0.00810) | (0.0224) |
| 2013 | 0.106*** | 0.0999*** | 0.144*** |
| | (0.0113) | (0.0110) | (0.0304) |
| 2014 | 0.129*** | 0.124*** | 0.185*** |
| | (0.0153) | (0.0147) | (0.0399) |
| **Ownership Status** | | | |
| Not-For-Profit (Omitted: For-Profit) | 0.00803 | 0.0154 | -0.00868 |
| | (0.0410) | (0.0376) | (0.0885) |
| Government | 0.210 | 0.204* | -0.0974 |
| | (0.132) | (0.119) | (0.152) |
| **Size** | | | |
| Medium (Omitted: Small) | -0.0176 | -0.0243 | -0.0211 |
| | (0.0273) | (0.0287) | (0.0528) |
| Large | -0.0491 | -0.0451 | -0.0997 |
| | (0.0676) | (0.0665) | (0.0995) |
| **Teaching Status** | | | |
| Major Teaching (Omitted: None) | 0.00246 | -0.00551 | 0.00865 |
| | (0.0552) | (0.0504) | (0.0773) |
| Minor Teaching | 0.0507*** | 0.0450** | 0.0502* |
| | (0.0183) | (0.0180) | (0.0286) |
| Network Member | -0.00545 | 0.00695 | -0.0330 |
| | (0.0249) | (0.0203) | (0.0330) |
| General Acute Care | 0.154* | 0.122 | 0.102 |
| | (0.0823) | (0.0899) | (0.0859) |
| System Market Share | -0.0842 | -0.138 | 0.251 |
| | (0.183) | (0.179) | (0.341) |
| Herfindahl Index (Competition) | 0.0589 | 0.0264 | 0.348 |
| | (0.0747) | (0.0728) | (0.223) |
| Case Mix Index | -0.0194 | -0.0177 | -0.0861 |
| | (0.0465) | (0.0441) | (0.0953) |
| **County Demographics** | | | |
| Income Per Capita in Thousands | -0.0014* | -0.0015 | 0.00069 |
| | (0.00076) | (0.00072) | (0.0022) |
| Unemployment Rate | 0.000804** | 0.000931*** | 0.000476 |
| | (0.000330) | (0.000325) | (0.000693) |
| PCPs per 1,000 persons | 0.0479 | 0.0586 | -0.134 |
| | (0.0412) | (0.0405) | (0.114) |
| Physicians per 1,000 persons | 0.00552 | -0.00263 | 0.0644 |
| | (0.0309) | (0.0311) | (0.0562) |
| Proportion Female | 0.583*** | 0.539*** | 0.762** |

| | | | |
|---|---|---|---|
| | (0.154) | (0.151) | (0.366) |
| Population Density | 0.00470** | 0.000874 | 0.0111*** |
| | (0.00233) | (0.00209) | (0.00299) |
| Proportion Over 65 | 2.008*** | 1.905*** | 2.895* |
| | (0.685) | (0.660) | (1.690) |
| Constant | 6.840*** | 6.696*** | 4.926*** |
| | (0.195) | (0.188) | (0.396) |
| | | | |
| Observations | 9,113 | 9,113 | 8,406 |
| R-squared | 0.121 | 0.108 | 0.068 |
| Number of Hospitals | 2,017 | 2,017 | 1,954 |