

E-COMPANION

HOW HOSPITALS DIFFERENTIATE HEALTH INFORMATION TECHNOLOGY PORTFOLIOS FOR CLINICAL CARE EFFICIENCY: INSIGHTS FROM THE HITECH ACT

Jessica Pye[†]

W.P. Carey School of Business
Arizona State University
Tempe, AZ 85281
jessica.pye@asu.edu

Arun Rai

Robinson College of Business
Georgia State University
Atlanta, GA 30303
arunrai@gsu.edu

John Qi Dong

Nanyang Business School
Nanyang Technological University
Singapore 639798
john.dong@ntu.edu.sg

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[†] Deceased.

Measurement Items

Table EC-1. Measurement Items for Variables

Variable	Source	Items
Search Differentiation for HIT	American Hospital Association (AHA) IT survey	<p>Does your hospital currently have a computerized system which allows for:</p> <ul style="list-style-type: none"> • Bar coding – Lab specimens • Bar coding – Pharmacy fracking • Bar coding – Pharmacy administration • Bar coding – Supply chain management • Bar coding – Medication administration • Bar coding – Patient identification • Bar coding – Caregiver verification • Bar coding – Pharmacy verification • Electronic clinical documentation – Patient demographics • Electronic clinical documentation – Physician notes • Electronic clinical documentation – Nursing notes • Electronic clinical documentation – Problem lists • Electronic clinical documentation – Medication lists • Electronic clinical documentation – Discharge summaries • Electronic clinical documentation – Advanced directives (e.g., DNR) • Computerized provider order entry – Laboratory tests • Computerized provider order entry – Radiology tests • Computerized provider order entry – Medications • Computerized provider order entry – Consultation requests • Computerized provider order entry – Nursing orders • Results viewing – Laboratory reports • Results viewing – Radiology reports • Results viewing – Radiology images • Results viewing – Diagnostic test results (e.g., EKG report, Echo report) • Results viewing – Diagnostic test images (e.g., EKG tracing) • Results viewing – Consultant reports • Decision support – Clinical guidelines (e.g., Beta blockers post-MI, ASA in CAD) • Decision support – Clinical reminders (e.g., pneumovax) • Decision support – Drug allergy alerts • Decision support – Drug-drug interaction alerts • Decision support – Drug-lab interaction alerts • Decision support – Drug dosing support • Decision support – Drug formulation check • Other functionalities – Other RFID • Other functionalities – Telehealth/Telemedicine • Other functionalities – Ability to connect mobile devices (e.g., tablet, smart phone, etc.) to EHR
Additional items for Search Differentiation for HIT	AHA IT survey	<p>Which of following patient data does your hospital electronically exchange/share with one or more of the provider types listed below?</p> <ul style="list-style-type: none"> • Patient demographics with hospitals in your system • Patient demographics with hospitals outside of your system • Laboratory results with hospitals in your system • Laboratory results with hospitals outside of your system • Medication history with hospitals in your system • Medication history with hospitals outside of your system • Radiology reports with hospitals in your system • Radiology reports with hospitals outside of your system • Clinical summary care record with hospitals in your system • Clinical summary care record with hospitals outside of your system

Variable	Source	Items
Cost-Based Performance Shortfalls	AHA annual survey	Total facility expenses, including: <ul style="list-style-type: none"> • Total facility payroll expenses • Total facility employee benefits • Depreciation expense • Interest expense • Supply expense • Other expenses
Policy Phase	Health Information Technology for Economic and Clinical Health (HITECH) Act	Conceptualization phase (2007-2008) Enactment phase (2009-2010) Enforcement phase (2011-2014)
Teaching Status	AHA annual survey	Member of Council of Teaching Hospital of the Association of American Medical Colleges (yes vs. no)
Nonprofit Status	AHA annual survey	Control code – Type of authority responsible for establishing policy concerning overall operation of the hospitals (nonprofit: 21, 23 vs. for-profit: 31, 32, 33)
Rural Location	AHA annual survey	Core-based statistical area type (rural vs. metro, micro, division)
Percent Medicare Days	AHA annual survey	Total facility Medicare days Total facility inpatient days
Case Load	AHA annual survey	Total facility admissions Full time total personnel
Capital Expense	AHA annual survey	Total capital expenditures
Hospital Size	AHA annual survey	General medical and surgical (adult) beds
Physician Staffing	AHA annual survey	Full time physicians and dentists
Research Focus	AHA annual survey	Health research – hospital (yes vs. no)
Number of Hospitals in System	AHA annual survey	Health care system ID (counting hospitals for each ID)
Physician Ownership Status	AHA annual survey	Is hospital owned in whole or in part by physicians or a physicians group?
HMO	AHA annual survey	Does the hospital have a formal written contract with an HMO?
PPO	AHA annual survey	Does the hospital have a formal written contract with a PPO?
Change in Leadership	AHA annual survey	Name of chief administrator (change over time)
Financial Slack	Centers for Medicare and Medicaid Services (CMS) report	Cash on hand and in banks Total current liabilities
Fixed Assets	CMS report	Total fixed assets
Net Patient Revenue	CMS report	Net patient revenues

Endogeneity Tests

Table EC-2. System GMM Model Results

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.145** (0.062)	0.377*** (0.110)	0.522*** (0.080)	-0.347*** (0.048)
Teaching Status	-0.119 (0.184)	-0.061 (0.277)	-0.075 (0.117)	-0.151 (0.137)
Nonprofit Status	0.646*** (0.145)	0.266 (0.282)	0.856*** (0.119)	0.779*** (0.119)
Rural Location	0.188 (0.129)	0.358 (0.264)	0.110 (0.102)	0.283** (0.110)
Percent Medicare Days	-0.604*** (0.207)	-0.730* (0.383)	-0.378** (0.169)	-0.232 (0.187)
Case Load	0.022** (0.011)	0.005 (0.018)	-0.009 (0.008)	-0.001 (0.009)
Financial Slack	0.034 (0.107)	0.406 (0.428)	0.059 (0.076)	0.088 (0.094)
Capital Expenses (log)	0.133*** (0.035)	0.134** (0.066)	0.127*** (0.027)	0.189*** (0.031)
Fixed Assets (log)	0.116** (0.051)	0.908*** (0.112)	0.080** (0.039)	0.171*** (0.042)
Net Patient Revenue (log)	0.122 (0.087)	0.826*** (0.183)	0.080 (0.072)	0.214*** (0.079)
Hospital Size (log)	0.286*** (0.043)	0.203*** (0.068)	0.278*** (0.033)	0.247*** (0.036)
Physician Staffing (log)	-0.016 (0.026)	0.045 (0.047)	-0.008 (0.018)	0.010 (0.021)
Research Focus	-0.216** (0.110)	0.027 (0.188)	-0.092 (0.078)	0.011 (0.084)
Number of Hospitals in System (log)	0.011 (0.027)	0.101** (0.049)	0.047** (0.021)	0.086*** (0.022)
Physician Ownership Status	-0.640*** (0.171)	-1.182** (0.476)	-0.072 (0.116)	-0.187 (0.154)
HMO	0.200 (0.134)	0.750*** (0.226)	-0.079 (0.101)	0.165 (0.108)
PPO	-0.044 (0.160)	-0.492* (0.263)	0.196 (0.119)	0.011 (0.128)
Change in Leadership	0.217** (0.093)	-0.106 (0.169)	0.063 (0.071)	0.068 (0.084)
Constant	-1.011 (0.726)	-11.891*** (1.477)	0.598 (0.625)	-2.953*** (0.626)
R ²	0.104	0.257	0.340	0.406
Number of Hospital-Year Observations	6,039	2,280	4,693	5,105

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. One-year lags of the regressors and the control variables are used as instruments.

Table EC-3. Results for Search Differentiation for HIT in the Subsequent Year

Search Differentiation for HIT in the Subsequent Year	A	B	C	D
Cost-Based Performance Shortfalls	0.367*** (0.124)	0.166 (0.135)	-0.084 (0.127)	0.662*** (0.130)
Conceptualization Phase		3.301*** (0.163)		
Enactment Phase			2.745*** (0.148)	
Enforcement Phase				-2.745*** (0.148)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.422*** (0.062)		
Cost-Based Performance Shortfalls × Enactment Phase			0.746*** (0.053)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.746*** (0.053)
Teaching Status	-1.219*** (0.378)	-0.900** (0.458)	-0.745** (0.335)	-0.745** (0.335)
Nonprofit Status	0.200 (0.550)	0.271 (0.467)	0.172 (0.507)	0.172 (0.507)
Rural Location	-0.313 (0.391)	-0.490 (0.357)	-0.344 (0.385)	-0.344 (0.385)
Percent Medicare Days	-0.084 (0.397)	0.102 (0.373)	-0.129 (0.379)	-0.129 (0.379)
Case Load	0.014 (0.019)	-0.011 (0.015)	0.026 (0.019)	0.026 (0.019)
Financial Slack	-0.077 (0.076)	0.055 (0.087)	-0.067 (0.068)	-0.067 (0.068)
Capital Expenses (log)	0.043 (0.031)	0.038 (0.029)	0.029 (0.030)	0.029 (0.030)
Fixed Assets (log)	0.179** (0.079)	0.166** (0.081)	0.223*** (0.075)	0.223*** (0.075)
Net Patient Revenue (log)	-0.354** (0.169)	-0.127 (0.171)	-0.149 (0.160)	-0.149 (0.160)
Hospital Size (log)	-0.464*** (0.125)	-0.462*** (0.124)	-0.350*** (0.114)	-0.350*** (0.114)
Physician Staffing (log)	0.018 (0.043)	-0.013 (0.042)	0.010 (0.039)	0.010 (0.039)
Research Focus	-0.375** (0.159)	-0.506*** (0.148)	-0.216 (0.158)	-0.216 (0.158)
Number of Hospitals in System (log)	-0.099* (0.057)	-0.067 (0.053)	-0.083 (0.056)	-0.083 (0.056)
Physician Ownership Status	-0.156 (0.219)	-0.301 (0.246)	-0.215 (0.207)	-0.215 (0.207)
HMO	0.008 (0.179)	0.019 (0.172)	0.008 (0.173)	0.008 (0.173)
PPO	0.113 (0.205)	-0.037 (0.194)	0.098 (0.196)	0.098 (0.196)
Change in Leadership	0.065 (0.067)	0.052 (0.065)	0.048 (0.066)	0.048 (0.066)
Constant	11.985*** (3.288)	4.228 (3.307)	3.321 (3.121)	6.066* (3.116)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.451	0.405	0.481	0.481
Number of Hospitals	3,123	3,319	3,123	3,123
Number of Hospital-Year Observations	9,438	11,316	9,438	9,438

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Alternative Measures for Search Differentiation for HIT

Table EC-4. Results for Level of HIT Implementations

Level of HIT Implementations	A	B	C	D
Cost-Based Performance Shortfalls	0.028* (0.015)	0.010 (0.015)	0.019 (0.015)	0.066*** (0.015)
Conceptualization Phase		-0.468*** (0.020)		
Enactment Phase			-0.058*** (0.020)	
Enforcement Phase				0.517*** (0.017)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.052*** (0.006)		
Cost-Based Performance Shortfalls × Enactment Phase			0.060*** (0.005)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.074*** (0.005)
Teaching Status	-0.126*** (0.040)	-0.116*** (0.040)	-0.111*** (0.040)	-0.093** (0.040)
Nonprofit Status	0.267*** (0.048)	0.271*** (0.048)	0.266*** (0.048)	0.270*** (0.047)
Rural Location	-0.364*** (0.057)	-0.344*** (0.057)	-0.351*** (0.057)	-0.320*** (0.057)
Percent Medicare Days	0.043 (0.050)	0.038 (0.050)	0.042 (0.050)	0.034 (0.050)
Case Load	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)
Financial Slack	-0.006 (0.018)	-0.007 (0.018)	-0.005 (0.018)	-0.005 (0.018)
Capital Expenses (log)	0.008** (0.004)	0.008** (0.004)	0.007* (0.004)	0.006* (0.004)
Fixed Assets (log)	0.079*** (0.010)	0.081*** (0.010)	0.080*** (0.010)	0.083*** (0.010)
Net Patient Revenue (log)	0.306*** (0.021)	0.318*** (0.021)	0.308*** (0.021)	0.325*** (0.021)
Hospital Size (log)	0.096*** (0.016)	0.097*** (0.016)	0.097*** (0.016)	0.100*** (0.016)
Physician Staffing (log)	0.005 (0.004)	0.005 (0.004)	0.004 (0.004)	0.004 (0.004)
Research Focus	-0.011 (0.016)	-0.007 (0.016)	-0.008 (0.016)	0.000 (0.016)
Number of Hospitals in System (log)	-0.002 (0.007)	-0.001 (0.006)	-0.002 (0.006)	-0.001 (0.006)
Physician Ownership Status	-0.095** (0.039)	-0.100** (0.039)	-0.097** (0.038)	-0.105*** (0.038)
HMO	0.022 (0.021)	0.020 (0.021)	0.022 (0.021)	0.020 (0.020)
PPO	-0.004 (0.023)	-0.004 (0.023)	-0.005 (0.023)	-0.005 (0.023)
Change in Leadership	0.002 (0.009)	0.003 (0.009)	0.001 (0.009)	0.002 (0.009)
Constant	-4.508*** (0.365)	-4.375*** (0.371)	-4.506*** (0.364)	-4.986*** (0.364)
Year Dummies	Yes	Yes	Yes	Yes
Wald Chi-square	4134.53	4141.23	4185.32	4219.04
Number of Hospitals	2,641	2,641	2,641	2,641
Number of Hospital-Year Observations	10,615	10,615	10,615	10,615

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Standard errors in parentheses.

Table EC-5. Results for Search Differentiation for HIT with Additional Items

Search Differentiation for HIT with Additional Items	A	B	C	D
Cost-Based Performance Shortfalls	0.504*** (0.152)	0.354** (0.154)	0.386** (0.152)	0.701*** (0.153)
Conceptualization Phase		2.135*** (0.186)		
Enactment Phase			-1.047*** (0.192)	
Enforcement Phase				-1.611*** (0.169)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.328*** (0.074)		
Cost-Based Performance Shortfalls × Enactment Phase			0.525*** (0.058)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.624*** (0.061)
Teaching Status	-0.703 (0.489)	-0.589 (0.482)	-0.483 (0.478)	-0.225 (0.473)
Nonprofit Status	0.545 (0.570)	0.543 (0.569)	0.536 (0.564)	0.532 (0.563)
Rural Location	-0.658 (0.532)	-0.648 (0.531)	-0.673 (0.531)	-0.658 (0.529)
Percent Medicare Days	0.133 (0.427)	0.102 (0.426)	0.111 (0.422)	0.049 (0.421)
Case Load	-0.019 (0.019)	-0.017 (0.018)	-0.015 (0.019)	-0.012 (0.018)
Financial Slack	0.027 (0.093)	0.022 (0.091)	0.031 (0.101)	0.024 (0.098)
Capital Expenses (log)	0.067* (0.034)	0.065* (0.034)	0.060* (0.034)	0.055* (0.034)
Fixed Assets (log)	0.144 (0.097)	0.153 (0.097)	0.164* (0.095)	0.186** (0.095)
Net Patient Revenue (log)	-0.197 (0.210)	-0.104 (0.210)	-0.134 (0.207)	0.054 (0.209)
Hospital Size (log)	-0.480*** (0.152)	-0.453*** (0.153)	-0.440*** (0.150)	-0.382** (0.153)
Physician Staffing (log)	-0.123*** (0.046)	-0.122*** (0.045)	-0.128*** (0.044)	-0.128*** (0.043)
Research Focus	-0.467*** (0.168)	-0.429** (0.167)	-0.419** (0.167)	-0.337** (0.167)
Number of Hospitals in System (log)	-0.054 (0.065)	-0.047 (0.065)	-0.051 (0.064)	-0.037 (0.064)
Physician Ownership Status	-0.197 (0.286)	-0.234 (0.285)	-0.216 (0.284)	-0.291 (0.282)
HMO	0.216 (0.204)	0.208 (0.202)	0.221 (0.202)	0.206 (0.201)
PPO	-0.055 (0.221)	-0.058 (0.220)	-0.070 (0.219)	-0.079 (0.217)
Change in Leadership	0.029 (0.080)	0.032 (0.079)	0.020 (0.079)	0.023 (0.078)
Constant	9.450** (3.937)	4.908 (3.978)	7.916** (3.888)	3.055 (3.938)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.192	0.195	0.203	0.211
Number of Hospitals	3,321	3,321	3,321	3,321
Number of Hospital-Year Observations	11,329	11,329	11,329	11,329

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Standard errors in parentheses. The Saidin index is computed based on the list of 36 items included in the original Saidin index for the main analysis plus 10 additional items for electronic exchange inside/outside of system.

Table EC-6. Results for Cost in the Subsequent Years

Cost in Subsequent Years	A	B
	One Year After	Two Years After
Search Differentiation for HIT	-0.005*** (0.001)	-0.001** (0.001)
Teaching Status	-0.019 (0.017)	-0.033* (0.018)
Nonprofit Status	0.010 (0.042)	-0.053* (0.030)
Percent Medicare Days	0.064*** (0.021)	0.053** (0.021)
Case Load	-0.007*** (0.001)	-0.006*** (0.002)
Financial Slack	-0.000 (0.005)	0.006 (0.004)
Capital Expenses (log)	0.002 (0.002)	0.001 (0.002)
Fixed Assets (log)	0.060*** (0.008)	0.054*** (0.009)
Net Patient Revenue (log)	0.277*** (0.021)	0.221*** (0.021)
Hospital Size (log)	0.013 (0.009)	-0.000 (0.010)
Physician Staffing (log)	0.009*** (0.002)	0.007*** (0.003)
Research Focus	0.025*** (0.008)	0.030*** (0.009)
Number of Hospitals in System (log)	0.007* (0.004)	0.012*** (0.005)
Physician Ownership Status	0.039** (0.019)	0.017 (0.037)
HMO	-0.001 (0.011)	-0.000 (0.010)
PPO	-0.004 (0.011)	-0.006 (0.011)
Change in Leadership	0.004 (0.004)	0.005 (0.004)
Constant	12.099*** (0.391)	13.367*** (0.397)
R ²	0.261	0.155
Number of Hospitals	3,174	2,941
Number of Hospital-Year Observations	9,292	7,330

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Alternative Measures for Cost-Based Performance Shortfalls

Table EC-7. Results Using Separate Cost-Based Performance Shortfalls

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls (Above Aspiration)	0.373*** (0.137)	0.178 (0.137)	0.239* (0.136)	0.579*** (0.139)
Cost-Based Performance Shortfalls (Below Aspiration)	0.541** (0.215)	0.206 (0.213)	0.578*** (0.216)	0.403 (0.335)
Conceptualization Phase		3.259*** (0.166)		
Enactment Phase			-1.467*** (0.166)	
Enforcement Phase				-2.769*** (0.149)
Cost-Based Performance Shortfalls (Above Aspiration) × Conceptualization Phase		0.431*** (0.063)		
Cost-Based Performance Shortfalls (Below Aspiration) × Conceptualization Phase		1.269* (0.664)		
Cost-Based Performance Shortfalls (Above Aspiration) × Enactment Phase			0.578*** (0.050)	
Cost-Based Performance Shortfalls (Below Aspiration) × Enactment Phase			-0.177 (0.337)	
Cost-Based Performance Shortfalls (Above Aspiration) × Enforcement Phase				-0.733*** (0.051)
Cost-Based Performance Shortfalls (Below Aspiration) × Enforcement Phase				-0.439 (0.314)
Teaching Status	-1.045** (0.481)	-0.897* (0.458)	-0.794* (0.464)	-0.481 (0.434)
Nonprofit Status	0.273 (0.469)	0.269 (0.467)	0.255 (0.460)	0.258 (0.456)
Rural Location	-0.509 (0.358)	-0.493 (0.356)	-0.524 (0.352)	-0.503 (0.351)
Percent Medicare Days	0.134 (0.375)	0.114 (0.373)	0.099 (0.367)	0.032 (0.363)
Case Load	-0.013 (0.015)	-0.010 (0.015)	-0.008 (0.015)	-0.005 (0.015)
Financial Slack	0.060 (0.092)	0.052 (0.087)	0.070 (0.099)	0.062 (0.094)
Capital Expenses (log)	0.041 (0.030)	0.039 (0.029)	0.033 (0.029)	0.026 (0.028)
Fixed Assets (log)	0.153* (0.082)	0.167** (0.081)	0.177** (0.080)	0.204*** (0.079)
Net Patient Revenue (log)	-0.240 (0.174)	-0.136 (0.172)	-0.161 (0.169)	0.064 (0.166)
Hospital Size (log)	-0.499*** (0.124)	-0.470*** (0.125)	-0.450*** (0.120)	-0.376*** (0.121)
Physician Staffing (log)	-0.013 (0.043)	-0.012 (0.042)	-0.018 (0.040)	-0.020 (0.037)
Research Focus	-0.555*** (0.150)	-0.502*** (0.148)	-0.493*** (0.149)	-0.400*** (0.147)
Number of Hospitals in System (log)	-0.077 (0.053)	-0.070 (0.053)	-0.073 (0.053)	-0.056 (0.053)
Physician Ownership Status	-0.262 (0.249)	-0.301 (0.246)	-0.283 (0.242)	-0.369 (0.238)
HMO	0.030 (0.174)	0.017 (0.172)	0.033 (0.171)	0.016 (0.168)
PPO	-0.037 (0.197)	-0.042 (0.194)	-0.061 (0.193)	-0.064 (0.189)
Change in Leadership	0.049 (0.066)	0.053 (0.065)	0.037 (0.065)	0.041 (0.064)
Constant	10.499*** (3.347)	4.365 (3.323)	8.593*** (3.237)	2.834 (3.195)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.399	0.405	0.415	0.428
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Cost-based performance shortfalls is separated into two variables when cost is above and below aspiration level.

Table EC-8. Results Using 10% Cost Reduction to Compute Aspiration Level

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.337** (0.132)	0.151 (0.132)	0.201 (0.131)	0.590*** (0.133)
Conceptualization Phase		3.284*** (0.166)		
Enactment Phase			-1.572*** (0.165)	
Enforcement Phase				-2.700*** (0.149)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.426*** (0.063)		
Cost-Based Performance Shortfalls × Enactment Phase			0.607*** (0.050)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.749*** (0.051)
Teaching Status	-1.047** (0.481)	-0.901** (0.459)	-0.797* (0.465)	-0.482 (0.434)
Nonprofit Status	0.277 (0.471)	0.273 (0.468)	0.267 (0.460)	0.259 (0.456)
Rural Location	-0.502 (0.359)	-0.490 (0.357)	-0.519 (0.355)	-0.502 (0.352)
Percent Medicare Days	0.143 (0.375)	0.106 (0.373)	0.118 (0.367)	0.047 (0.363)
Case Load	-0.013 (0.015)	-0.011 (0.015)	-0.009 (0.015)	-0.005 (0.015)
Financial Slack	0.061 (0.092)	0.056 (0.087)	0.065 (0.099)	0.057 (0.093)
Capital Expenses (log)	0.040 (0.030)	0.038 (0.029)	0.033 (0.029)	0.027 (0.028)
Fixed Assets (log)	0.154* (0.082)	0.167** (0.081)	0.177** (0.079)	0.204*** (0.078)
Net Patient Revenue (log)	-0.242 (0.173)	-0.124 (0.171)	-0.170 (0.168)	0.055 (0.166)
Hospital Size (log)	-0.495*** (0.124)	-0.462*** (0.124)	-0.450*** (0.120)	-0.381*** (0.121)
Physician Staffing (log)	-0.014 (0.043)	-0.013 (0.042)	-0.021 (0.040)	-0.020 (0.037)
Research Focus	-0.556*** (0.150)	-0.508*** (0.148)	-0.503*** (0.149)	-0.406*** (0.148)
Number of Hospitals in System (log)	-0.077 (0.053)	-0.068 (0.053)	-0.073 (0.053)	-0.057 (0.053)
Physician Ownership Status	-0.253 (0.249)	-0.301 (0.246)	-0.276 (0.244)	-0.366 (0.239)
HMO	0.031 (0.174)	0.019 (0.172)	0.036 (0.171)	0.017 (0.168)
PPO	-0.034 (0.197)	-0.037 (0.194)	-0.051 (0.193)	-0.061 (0.189)
Change in Leadership	0.049 (0.066)	0.052 (0.065)	0.038 (0.065)	0.041 (0.064)
Constant	10.558*** (3.328)	4.181 (3.307)	8.816*** (3.223)	2.968 (3.189)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.399	0.405	0.414	0.428
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Instead of 5% cost reduction, 10% cost reduction is used to calculate the parameter of self-performance improvement when computing aspiration level.

Table EC-9. Results Using 15% Cost Reduction to Compute Aspiration Level

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.313** (0.129)	0.133 (0.128)	0.177 (0.127)	0.583*** (0.130)
Conceptualization Phase		3.268*** (0.169)		
Enactment Phase			-1.603*** (0.167)	
Enforcement Phase				-2.669*** (0.151)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.429*** (0.064)		
Cost-Based Performance Shortfalls × Enactment Phase			0.611*** (0.051)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.753*** (0.052)
Teaching Status	-1.047** (0.481)	-0.902** (0.459)	-0.800* (0.465)	-0.488 (0.434)
Nonprofit Status	0.281 (0.471)	0.277 (0.468)	0.271 (0.460)	0.261 (0.456)
Rural Location	-0.502 (0.360)	-0.490 (0.358)	-0.517 (0.355)	-0.500 (0.353)
Percent Medicare Days	0.144 (0.375)	0.110 (0.373)	0.121 (0.367)	0.054 (0.364)
Case Load	-0.013 (0.015)	-0.011 (0.015)	-0.009 (0.015)	-0.006 (0.015)
Financial Slack	0.061 (0.092)	0.056 (0.087)	0.065 (0.099)	0.057 (0.094)
Capital Expenses (log)	0.040 (0.030)	0.038 (0.029)	0.033 (0.029)	0.027 (0.028)
Fixed Assets (log)	0.155* (0.082)	0.167** (0.081)	0.177** (0.079)	0.205*** (0.078)
Net Patient Revenue (log)	-0.237 (0.173)	-0.120 (0.171)	-0.165 (0.168)	0.056 (0.166)
Hospital Size (log)	-0.494*** (0.124)	-0.462*** (0.124)	-0.450*** (0.120)	-0.383*** (0.121)
Physician Staffing (log)	-0.014 (0.043)	-0.013 (0.042)	-0.021 (0.040)	-0.020 (0.037)
Research Focus	-0.557*** (0.150)	-0.510*** (0.148)	-0.505*** (0.149)	-0.412*** (0.148)
Number of Hospitals in System (log)	-0.077 (0.053)	-0.068 (0.053)	-0.074 (0.053)	-0.058 (0.053)
Physician Ownership Status	-0.254 (0.249)	-0.302 (0.246)	-0.277 (0.244)	-0.367 (0.239)
HMO	0.031 (0.174)	0.019 (0.172)	0.036 (0.171)	0.016 (0.168)
PPO	-0.034 (0.197)	-0.037 (0.194)	-0.051 (0.193)	-0.060 (0.190)
Change in Leadership	0.049 (0.066)	0.052 (0.065)	0.038 (0.065)	0.042 (0.064)
Constant	10.493*** (3.328)	4.132 (3.308)	8.771*** (3.225)	2.938 (3.193)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.399	0.404	0.414	0.427
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Instead of 5% cost reduction, 15% cost reduction is used to calculate the parameter of self-performance improvement when computing aspiration level.

Table EC-10. Results Using 20% Cost Reduction to Compute Aspiration Level

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.289** (0.124)	0.118 (0.124)	0.154 (0.123)	0.578*** (0.126)
Conceptualization Phase		3.250*** (0.173)		
Enactment Phase			-1.638*** (0.170)	
Enforcement Phase				-2.633*** (0.154)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.431*** (0.065)		
Cost-Based Performance Shortfalls × Enactment Phase			0.615*** (0.052)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.757*** (0.053)
Teaching Status	-1.048** (0.481)	-0.904** (0.459)	-0.804* (0.465)	-0.495 (0.435)
Nonprofit Status	0.284 (0.472)	0.279 (0.469)	0.275 (0.461)	0.263 (0.457)
Rural Location	-0.502 (0.360)	-0.489 (0.358)	-0.516 (0.355)	-0.498 (0.354)
Percent Medicare Days	0.146 (0.375)	0.114 (0.373)	0.123 (0.368)	0.061 (0.364)
Case Load	-0.013 (0.015)	-0.012 (0.015)	-0.010 (0.015)	-0.006 (0.015)
Financial Slack	0.061 (0.092)	0.056 (0.088)	0.064 (0.100)	0.056 (0.095)
Capital Expenses (log)	0.040 (0.030)	0.038 (0.029)	0.033 (0.029)	0.027 (0.028)
Fixed Assets (log)	0.155* (0.082)	0.168** (0.081)	0.178** (0.080)	0.205*** (0.079)
Net Patient Revenue (log)	-0.233 (0.173)	-0.117 (0.171)	-0.161 (0.168)	0.057 (0.166)
Hospital Size (log)	-0.493*** (0.124)	-0.462*** (0.124)	-0.449*** (0.120)	-0.385*** (0.121)
Physician Staffing (log)	-0.014 (0.043)	-0.013 (0.042)	-0.021 (0.040)	-0.020 (0.038)
Research Focus	-0.557*** (0.150)	-0.512*** (0.149)	-0.509*** (0.149)	-0.419*** (0.148)
Number of Hospitals in System (log)	-0.077 (0.053)	-0.069 (0.053)	-0.075 (0.053)	-0.060 (0.053)
Physician Ownership Status	-0.254 (0.249)	-0.302 (0.246)	-0.278 (0.244)	-0.367 (0.240)
HMO	0.031 (0.174)	0.020 (0.172)	0.035 (0.171)	0.016 (0.168)
PPO	-0.034 (0.197)	-0.037 (0.194)	-0.050 (0.193)	-0.059 (0.190)
Change in Leadership	0.049 (0.066)	0.052 (0.065)	0.038 (0.065)	0.042 (0.064)
Constant	10.431*** (3.328)	4.092 (3.309)	8.736*** (3.228)	2.924 (3.198)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.399	0.404	0.413	0.426
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Instead of 5% cost reduction, 20% cost reduction is used to calculate the parameter of self-performance improvement when computing aspiration level.

Table EC-11. Results Using Social Aspiration

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls (Relative to Social Aspiration)	1.134*** (0.166)	0.944*** (0.165)	0.867*** (0.169)	1.295*** (0.171)
Conceptualization Phase		6.003*** (1.214)		
Enactment Phase			-2.614*** (0.899)	
Enforcement Phase				-3.393*** (0.780)
Cost-Based Performance Shortfalls (Relative to Social Aspiration) × Conceptualization Phase		0.480*** (0.062)		
Social Cost-Based Performance Shortfalls (Relative to Social Aspiration) × Enactment Phase			0.621*** (0.047)	
Social Cost-Based Performance Shortfalls (Relative to Social Aspiration) × Enforcement Phase				-0.801*** (0.049)
Cost-Based Performance Shortfalls (Relative to Historical Aspiration)	-0.452 (0.307)	-0.141 (0.310)	-0.616** (0.311)	-0.680 (0.651)
Cost-Based Performance Shortfalls (Relative to Historical Aspiration) × Conceptualization Phase		-2.566** (1.131)		
Social Cost-Based Performance Shortfalls (Relative to Historical Aspiration) × Enactment Phase			1.276 (0.860)	
Social Cost-Based Performance Shortfalls (Relative to Historical Aspiration) × Enforcement Phase				0.420 (0.716)
Teaching Status	-1.022** (0.481)	-0.865* (0.459)	-0.762 (0.463)	-0.422 (0.429)
Nonprofit Status	0.150 (0.457)	0.122 (0.455)	0.155 (0.450)	0.135 (0.449)
Rural Location	-0.523 (0.359)	-0.517 (0.349)	-0.558 (0.352)	-0.560 (0.344)
Percent Medicare Days	0.112 (0.373)	0.013 (0.369)	0.077 (0.362)	-0.065 (0.357)
Case Load	-0.011 (0.015)	-0.006 (0.014)	-0.004 (0.015)	0.004 (0.014)
Financial Slack	0.057 (0.092)	0.049 (0.086)	0.072 (0.097)	0.058 (0.086)
Capital Expenses (log)	0.045 (0.029)	0.043 (0.029)	0.037 (0.029)	0.031 (0.028)
Fixed Assets (log)	0.138* (0.081)	0.146* (0.080)	0.164** (0.078)	0.182** (0.077)
Net Patient Revenue (log)	-0.339* (0.173)	-0.276 (0.170)	-0.243 (0.167)	-0.048 (0.161)
Hospital Size (log)	-0.536*** (0.124)	-0.506*** (0.125)	-0.484*** (0.119)	-0.397*** (0.120)
Physician Staffing (log)	-0.019 (0.043)	-0.016 (0.041)	-0.021 (0.039)	-0.021 (0.037)
Research Focus	-0.549*** (0.149)	-0.485*** (0.147)	-0.479*** (0.147)	-0.342** (0.145)
Number of Hospitals in System (log)	-0.063 (0.053)	-0.054 (0.052)	-0.056 (0.052)	-0.034 (0.052)
Physician Ownership Status	-0.287 (0.253)	-0.311 (0.250)	-0.299 (0.245)	-0.376 (0.240)
HMO	0.018 (0.174)	0.005 (0.170)	0.034 (0.170)	0.021 (0.166)
PPO	-0.051 (0.196)	-0.050 (0.193)	-0.085 (0.191)	-0.093 (0.187)
Change in Leadership	0.053 (0.066)	0.054 (0.065)	0.042 (0.065)	0.040 (0.064)
Constant	12.500*** (3.314)	7.012** (3.269)	10.441*** (3.192)	5.433* (3.163)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.402	0.410	0.421	0.438
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,317	11,317	11,317	11,317

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Table EC-12. Results Using Cost-Based Performance Shortfalls Normalized by Number of Beds

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls (Normalized by Number of Beds)	0.208** (0.086)	0.128 (0.087)	0.106 (0.087)	0.623*** (0.104)
Conceptualization Phase		3.996*** (0.130)		
Enactment Phase			-0.762*** (0.144)	
Enforcement Phase				-3.828*** (0.123)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.431*** (0.100)		
Cost-Based Performance Shortfalls × Enactment Phase			0.507*** (0.081)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.677*** (0.083)
Teaching Status	-0.767 (0.493)	-0.738 (0.496)	-0.739 (0.497)	-0.685 (0.505)
Nonprofit Status	-0.037 (0.481)	0.044 (0.473)	0.010 (0.470)	0.153 (0.456)
Rural Location	-0.527 (0.369)	-0.545 (0.375)	-0.563 (0.376)	-0.602 (0.391)
Percent Medicare Days	-0.165 (0.396)	-0.175 (0.395)	-0.143 (0.393)	-0.150 (0.392)
Case Load	-0.033* (0.018)	-0.031* (0.017)	-0.031* (0.018)	-0.026 (0.017)
Financial Slack	0.032 (0.114)	0.037 (0.117)	0.020 (0.112)	0.023 (0.115)
Capital Expenses (log)	0.025 (0.032)	0.025 (0.032)	0.025 (0.031)	0.023 (0.031)
Fixed Assets (log)	0.100 (0.106)	0.104 (0.105)	0.094 (0.107)	0.098 (0.106)
Net Patient Revenue (log)	-0.244 (0.194)	-0.185 (0.191)	-0.167 (0.192)	-0.050 (0.189)
Hospital Size (log)	-0.033 (0.044)	-0.030 (0.043)	-0.037 (0.043)	-0.034 (0.042)
Physician Staffing (log)	-0.530*** (0.152)	-0.492*** (0.152)	-0.533*** (0.150)	-0.476*** (0.150)
Research Focus	-0.050 (0.056)	-0.045 (0.055)	-0.049 (0.055)	-0.040 (0.055)
Number of Hospitals in System (log)	-0.228 (0.273)	-0.186 (0.269)	-0.168 (0.269)	-0.082 (0.264)
Physician Ownership Status	0.053 (0.179)	0.049 (0.178)	0.072 (0.178)	0.073 (0.178)
HMO	-0.059 (0.205)	-0.063 (0.205)	-0.080 (0.204)	-0.093 (0.204)
PPO	0.063 (0.069)	0.062 (0.069)	0.065 (0.069)	0.064 (0.068)
Change in Leadership	11.028*** (3.893)	5.516 (3.877)	9.716** (3.856)	6.892* (3.796)
Constant	0.208** (0.086)	0.128 (0.087)	0.106 (0.087)	0.623*** (0.104)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.414	0.417	0.419	0.424
Number of Hospitals	2,900	2,900	2,900	2,900
Number of Hospital-Year Observations	10,259	10,259	10,259	10,259

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Table EC-13. Results Using Cost-Based Performance Shortfalls Normalized by Number of Inpatient Days

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls (Normalized by Number of Inpatient Days)	0.283** (0.111)	0.239** (0.111)	0.125 (0.113)	0.790*** (0.147)
Conceptualization Phase		3.956*** (0.145)		
Enactment Phase			-0.901*** (0.154)	
Enforcement Phase				-3.612*** (0.133)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.301** (0.151)		
Cost-Based Performance Shortfalls × Enactment Phase			0.738*** (0.123)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.793*** (0.126)
Teaching Status	-1.061** (0.480)	-1.057** (0.481)	-1.029** (0.479)	-1.018** (0.481)
Nonprofit Status	0.283 (0.469)	0.314 (0.467)	0.298 (0.466)	0.381 (0.462)
Rural Location	-0.469 (0.363)	-0.480 (0.365)	-0.483 (0.372)	-0.512 (0.380)
Percent Medicare Days	0.081 (0.378)	0.081 (0.377)	0.078 (0.376)	0.076 (0.374)
Case Load	-0.011 (0.015)	-0.011 (0.015)	-0.014 (0.015)	-0.013 (0.015)
Financial Slack	0.058 (0.092)	0.055 (0.090)	0.076 (0.091)	0.070 (0.085)
Capital Expenses (log)	0.042 (0.030)	0.041 (0.029)	0.038 (0.029)	0.035 (0.029)
Fixed Assets (log)	0.113 (0.088)	0.112 (0.087)	0.115 (0.087)	0.112 (0.087)
Net Patient Revenue (log)	-0.153 (0.171)	-0.137 (0.170)	-0.152 (0.171)	-0.110 (0.169)
Hospital Size (log)	-0.487*** (0.125)	-0.489*** (0.125)	-0.474*** (0.124)	-0.476*** (0.125)
Physician Staffing (log)	-0.012 (0.043)	-0.012 (0.043)	-0.016 (0.042)	-0.017 (0.042)
Research Focus	-0.549*** (0.151)	-0.541*** (0.150)	-0.549*** (0.149)	-0.529*** (0.147)
Number of Hospitals in System (log)	-0.072 (0.053)	-0.071 (0.053)	-0.076 (0.052)	-0.075 (0.052)
Physician Ownership Status	-0.273 (0.249)	-0.276 (0.249)	-0.273 (0.248)	-0.282 (0.250)
HMO	0.032 (0.175)	0.032 (0.175)	0.021 (0.175)	0.020 (0.176)
PPO	-0.041 (0.197)	-0.043 (0.197)	-0.040 (0.196)	-0.045 (0.197)
Change in Leadership	0.044 (0.066)	0.042 (0.066)	0.046 (0.065)	0.041 (0.065)
Constant	10.065*** (3.296)	5.648* (3.307)	10.145*** (3.277)	8.939*** (3.255)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.398	0.399	0.402	0.404
Number of Hospitals	3,331	3,331	3,331	3,331
Number of Hospital-Year Observations	11,357	11,357	11,357	11,357

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Sensitivity Analysis for Reference Groups

Table EC-14. Results Using Nonprofit Hospitals as Reference Group

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.272* (0.168)	0.122 (0.162)	0.119 (0.166)	0.774*** (0.171)
Conceptualization Phase		3.720*** (0.179)		
Enactment Phase			-1.788*** (0.170)	
Enforcement Phase				-3.292*** (0.158)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.648*** (0.085)		
Cost-Based Performance Shortfalls × Enactment Phase			0.688*** (0.067)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.921*** (0.069)
Teaching Status	-0.890* (0.474)	-0.696 (0.454)	-0.692 (0.461)	-0.349 (0.439)
Rural Location	-0.544 (0.333)	-0.544* (0.328)	-0.564* (0.326)	-0.571* (0.317)
Percent Medicare Days	-0.015 (0.376)	-0.044 (0.373)	-0.011 (0.368)	-0.050 (0.362)
Case Load	-0.030 (0.019)	-0.026 (0.018)	-0.024 (0.018)	-0.018 (0.018)
Financial Slack	0.091 (0.087)	0.086 (0.082)	0.091 (0.092)	0.085 (0.087)
Capital Expenses (log)	0.048 (0.031)	0.047 (0.030)	0.042 (0.030)	0.038 (0.030)
Fixed Assets (log)	0.149* (0.087)	0.162* (0.086)	0.165* (0.085)	0.188** (0.084)
Net Patient Revenue (log)	-0.409** (0.169)	-0.267 (0.165)	-0.319* (0.164)	-0.087 (0.161)
Hospital Size (log)	-0.400*** (0.127)	-0.369*** (0.125)	-0.364*** (0.123)	-0.308** (0.121)
Physician Staffing (log)	-0.014 (0.043)	-0.013 (0.041)	-0.021 (0.039)	-0.021 (0.037)
Research Focus	-0.472*** (0.151)	-0.437*** (0.149)	-0.444*** (0.151)	-0.385** (0.150)
Number of Hospitals in System (log)	-0.056 (0.055)	-0.047 (0.054)	-0.054 (0.054)	-0.041 (0.055)
Physician Ownership Status	0.012 (0.274)	-0.034 (0.273)	-0.040 (0.271)	-0.123 (0.268)
HMO	0.151 (0.169)	0.130 (0.167)	0.144 (0.166)	0.111 (0.163)
PPO	-0.160 (0.196)	-0.153 (0.193)	-0.168 (0.192)	-0.160 (0.188)
Change in Leadership	0.072 (0.068)	0.078 (0.068)	0.060 (0.068)	0.064 (0.067)
Constant	13.648*** (3.328)	5.968* (3.270)	11.710*** (3.226)	5.423* (3.182)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.505	0.512	0.516	0.529
Number of Hospitals	2,628	2,628	2,628	2,628
Number of Hospital-Year Observations	9,554	9,554	9,554	9,554

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Cost-based performance shortfalls and search differentiation for HIT are calculated using all other nonprofit hospitals as the reference group.

Table EC-15. Results Using Rural Hospitals as Reference Group

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.900* (0.545)	0.577 (0.556)	0.533 (0.563)	1.251** (0.590)
Conceptualization Phase		2.814*** (0.728)		
Enactment Phase			-1.594** (0.668)	
Enforcement Phase				-2.217*** (0.612)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.713** (0.361)		
Cost-Based Performance Shortfalls × Enactment Phase			0.762*** (0.280)	
Cost-Based Performance Shortfalls × Enforcement Phase				-1.055*** (0.257)
Nonprofit Status	2.480 (3.368)	2.538 (3.415)	2.675 (3.350)	2.835 (3.417)
Percent Medicare Days	-0.236 (0.692)	-0.289 (0.692)	-0.261 (0.688)	-0.350 (0.688)
Case Load	-0.101 (0.071)	-0.092 (0.071)	-0.087 (0.070)	-0.068 (0.070)
Financial Slack	0.219 (0.446)	0.250 (0.443)	0.195 (0.450)	0.231 (0.444)
Capital Expenses (log)	0.041 (0.100)	0.040 (0.100)	0.054 (0.099)	0.058 (0.099)
Fixed Assets (log)	0.204 (0.420)	0.165 (0.423)	0.153 (0.417)	0.077 (0.422)
Net Patient Revenue (log)	0.581 (0.644)	0.640 (0.626)	0.582 (0.655)	0.670 (0.632)
Hospital Size (log)	-0.241 (0.339)	-0.244 (0.334)	-0.219 (0.349)	-0.214 (0.347)
Physician Staffing (log)	-0.492** (0.201)	-0.483** (0.199)	-0.436** (0.205)	-0.400** (0.204)
Research Focus	-0.882 (1.398)	-0.731 (1.320)	-1.045 (1.423)	-0.884 (1.334)
Number of Hospitals in System (log)	0.221 (0.233)	0.255 (0.227)	0.241 (0.234)	0.300 (0.227)
Physician Ownership Status	-1.327* (0.768)	-1.269 (0.784)	-1.302* (0.756)	-1.206 (0.775)
HMO	-0.045 (0.478)	-0.074 (0.482)	-0.024 (0.474)	-0.060 (0.482)
PPO	0.067 (0.495)	0.055 (0.495)	0.033 (0.491)	0.003 (0.493)
Change in Leadership	-0.081 (0.259)	-0.107 (0.258)	-0.044 (0.260)	-0.068 (0.260)
Constant	-7.949 (11.557)	-12.140 (11.438)	-7.412 (11.618)	-9.241 (11.363)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.244	0.247	0.250	0.258
Number of Hospitals	535	535	535	535
Number of Hospital-Year Observations	1,726	1,726	1,726	1,726

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Cost-based performance shortfalls and search differentiation for HIT are calculated using all other rural hospitals as the reference group.

Table EC-16. Results Using Hospitals within the Same System as Reference Group

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.177*** (0.034)	0.105*** (0.036)	0.115*** (0.035)	0.470*** (0.049)
Conceptualization Phase		0.720*** (0.156)		
Enactment Phase			0.825*** (0.142)	
Enforcement Phase				-1.141*** (0.115)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.324*** (0.072)		
Cost-Based Performance Shortfalls × Enactment Phase			0.440*** (0.070)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.462*** (0.054)
Teaching Status	-0.047 (0.162)	0.038 (0.160)	0.044 (0.158)	0.192 (0.155)
Nonprofit Status	-0.512** (0.208)	-0.529** (0.206)	-0.459** (0.204)	-0.471** (0.200)
Rural Location	0.002 (0.138)	0.046 (0.136)	0.036 (0.134)	0.108 (0.131)
Percent Medicare Days	-0.303 (0.218)	-0.203 (0.216)	-0.206 (0.213)	-0.034 (0.208)
Case Load	-0.002 (0.010)	-0.014 (0.010)	-0.006 (0.010)	-0.026*** (0.009)
Financial Slack	0.005 (0.010)	0.007 (0.010)	0.005 (0.010)	0.007 (0.010)
Capital Expenses (log)	0.073** (0.035)	0.034 (0.034)	0.103*** (0.034)	0.052 (0.033)
Fixed Assets (log)	-0.019 (0.053)	0.008 (0.053)	-0.002 (0.052)	0.043 (0.051)
Net Patient Revenue (log)	0.176** (0.086)	0.264*** (0.085)	0.146* (0.084)	0.276*** (0.082)
Hospital Size (log)	0.316*** (0.045)	0.301*** (0.044)	0.294*** (0.044)	0.266*** (0.043)
Physician Staffing (log)	-0.047 (0.029)	-0.053* (0.029)	-0.044 (0.028)	-0.054* (0.028)
Research Focus	-0.270*** (0.104)	-0.253** (0.103)	-0.266*** (0.102)	-0.240** (0.099)
Number of Hospitals in System (log)	1.162*** (0.070)	1.171*** (0.070)	1.155*** (0.069)	1.170*** (0.068)
Physician Ownership Status	0.366 (0.235)	0.404* (0.233)	0.454** (0.230)	0.534** (0.225)
HMO	-0.240* (0.140)	-0.192 (0.138)	-0.225* (0.136)	-0.145 (0.133)
PPO	0.123 (0.156)	0.072 (0.155)	0.110 (0.152)	0.030 (0.149)
Change in Leadership	0.252*** (0.093)	0.231** (0.091)	0.237*** (0.090)	0.202** (0.088)
Constant	-4.579*** (1.168)	-6.100*** (1.161)	-5.051*** (1.143)	-6.442*** (1.117)
Variance(System)	1.260	1.228	1.212	1.211
Variance(Hospital)	8.959	8.754	8.518	8.105
Number of Systems	422	422	422	422
Number of Observations	7,364	7,364	7,364	7,364

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Cost-based performance shortfalls and search differentiation for HIT are calculated using all other hospitals within the same system as the reference group. A multilevel model is used to account for the system that a hospital belongs to in this analysis.

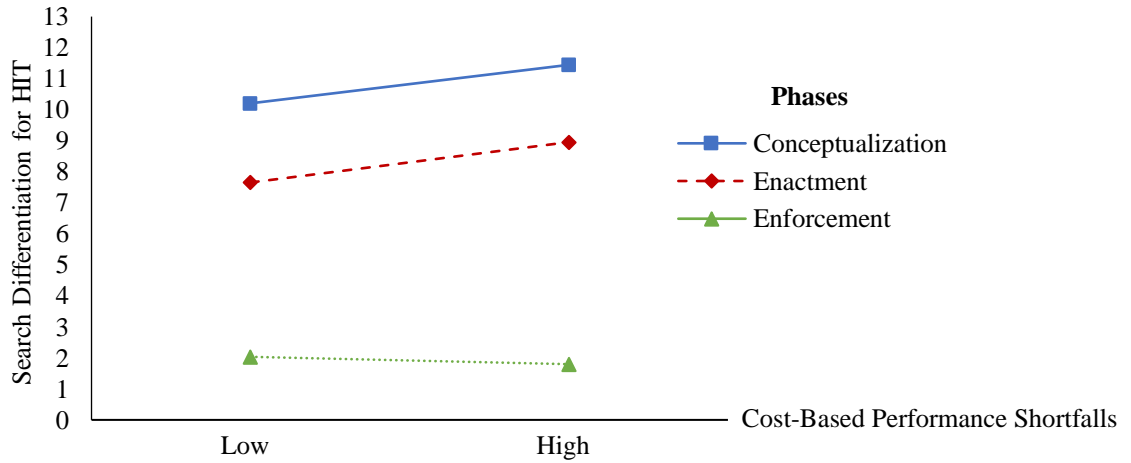


Figure EC-1. Interaction Plot for Nonprofit Hospitals as Reference Group

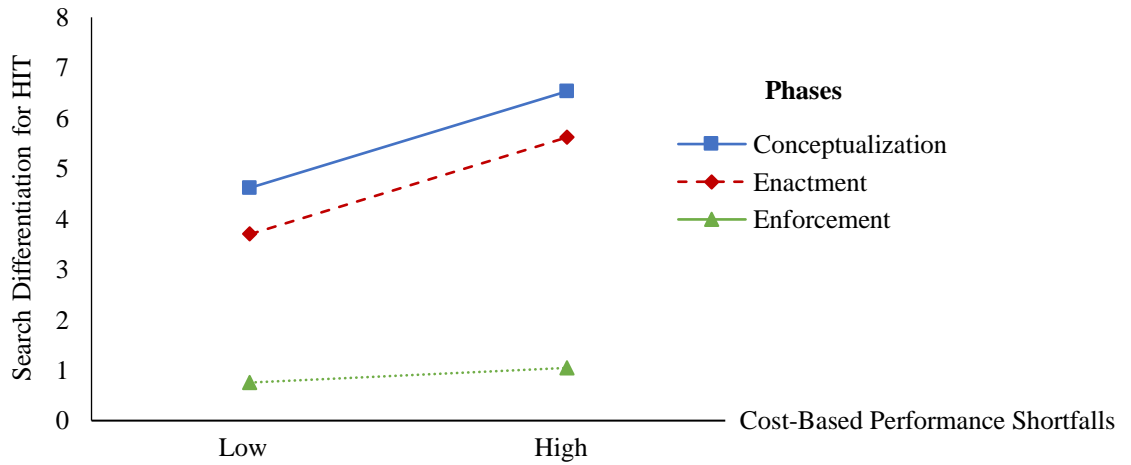


Figure EC-2. Interaction Plot for Rural Hospitals as Reference Group

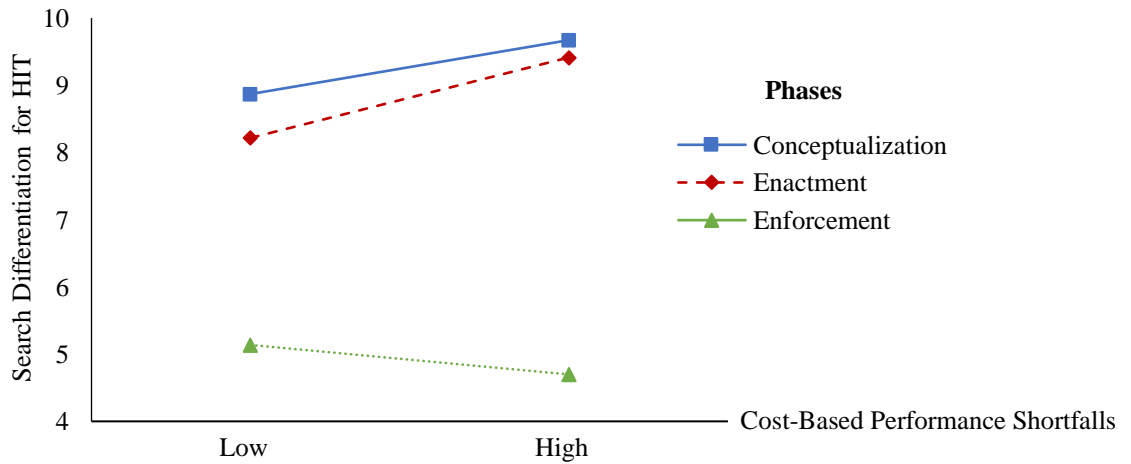


Figure EC-3. Interaction Plot for Hospitals within the Same System as Reference Group

Table EC-17. Results Using Top Performers as Reference Group

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.359*** (0.135)	0.166 (0.135)	0.223* (0.135)	0.595*** (0.137)
Conceptualization Phase		3.301*** (0.163)		
Enactment Phase			-1.542*** (0.163)	
Enforcement Phase				-2.731*** (0.147)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.422*** (0.062)		
Cost-Based Performance Shortfalls × Enactment Phase			0.602*** (0.049)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.744*** (0.050)
Teaching Status	-1.046** (0.481)	-0.900** (0.458)	-0.794* (0.465)	-0.477 (0.433)
Nonprofit Status	0.272 (0.470)	0.271 (0.467)	0.263 (0.459)	0.257 (0.455)
Rural Location	-0.502 (0.359)	-0.490 (0.357)	-0.520 (0.354)	-0.503 (0.352)
Percent Medicare Days	0.141 (0.375)	0.102 (0.373)	0.116 (0.367)	0.042 (0.363)
Case Load	-0.013 (0.015)	-0.011 (0.015)	-0.009 (0.015)	-0.005 (0.015)
Financial Slack	0.061 (0.092)	0.055 (0.087)	0.066 (0.099)	0.058 (0.093)
Capital Expenses (log)	0.040 (0.030)	0.038 (0.029)	0.033 (0.029)	0.027 (0.028)
Fixed Assets (log)	0.154* (0.082)	0.166** (0.081)	0.177** (0.079)	0.204*** (0.078)
Net Patient Revenue (log)	-0.246 (0.174)	-0.127 (0.171)	-0.174 (0.168)	0.053 (0.166)
Hospital Size (log)	-0.496*** (0.124)	-0.462*** (0.124)	-0.451*** (0.120)	-0.380*** (0.121)
Physician Staffing (log)	-0.014 (0.043)	-0.013 (0.042)	-0.021 (0.040)	-0.020 (0.037)
Research Focus	-0.556*** (0.150)	-0.506*** (0.148)	-0.500*** (0.149)	-0.400*** (0.148)
Number of Hospitals in System (log)	-0.076 (0.053)	-0.067 (0.053)	-0.073 (0.053)	-0.056 (0.053)
Physician Ownership Status	-0.253 (0.249)	-0.301 (0.246)	-0.276 (0.243)	-0.366 (0.238)
HMO	0.030 (0.174)	0.019 (0.172)	0.036 (0.171)	0.017 (0.168)
PPO	-0.034 (0.197)	-0.037 (0.194)	-0.052 (0.193)	-0.062 (0.189)
Change in Leadership	0.049 (0.066)	0.052 (0.065)	0.038 (0.065)	0.041 (0.064)
Constant	10.622*** (3.329)	4.228 (3.307)	8.864*** (3.221)	3.000 (3.185)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.399	0.405	0.414	0.428
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses. Cost-Based Performance Shortfalls is calculated using top performers above 90th percentile as the reference group.

Alternative Model Specifications

Table EC-18. Hausman Test for Hospital Fixed Effects and Random Effects Models

	Chi-square	<i>p</i>-value
Model A	160.28	0.0001
Model B	138.57	0.0001
Model C	131.80	0.0001
Model D	93.51	0.0001

Notes: The Hausman test rejects the null hypothesis in favor of a hospital random effects model specification and thus, a hospital fixed effects model specification is appropriate.

Table EC-19. Hospital Random Effects Model Results

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	0.080* (0.049)	-0.186*** (0.050)	-0.227*** (0.049)	0.354*** (0.052)
Conceptualization Phase		3.358*** (0.114)		
Enactment Phase			-1.799*** (0.125)	
Enforcement Phase				-2.783*** (0.098)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.474*** (0.046)		
Cost-Based Performance Shortfalls × Enactment Phase			0.657*** (0.040)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.786*** (0.034)
Teaching Status	-0.166 (0.148)	-0.174 (0.148)	-0.141 (0.147)	-0.148 (0.147)
Nonprofit Status	0.802*** (0.105)	0.794*** (0.105)	0.785*** (0.104)	0.767*** (0.104)
Rural Location	0.196* (0.107)	0.214** (0.107)	0.205* (0.107)	0.237** (0.107)
Percent Medicare Days	0.130 (0.154)	0.109 (0.153)	0.123 (0.153)	0.086 (0.152)
Case Load	-0.021*** (0.007)	-0.022*** (0.007)	-0.020*** (0.007)	-0.021*** (0.007)
Financial Slack	0.008 (0.009)	0.007 (0.009)	0.008 (0.008)	0.006 (0.008)
Capital Expenses (log)	0.086*** (0.022)	0.083*** (0.022)	0.079*** (0.022)	0.071*** (0.022)
Fixed Assets (log)	0.255*** (0.039)	0.252*** (0.039)	0.256*** (0.039)	0.251*** (0.038)
Net Patient Revenue (log)	0.387*** (0.064)	0.411*** (0.064)	0.393*** (0.064)	0.434*** (0.064)
Hospital Size (log)	0.196*** (0.029)	0.195*** (0.029)	0.195*** (0.029)	0.194*** (0.029)
Physician Staffing (log)	-0.013 (0.021)	-0.013 (0.021)	-0.014 (0.021)	-0.013 (0.021)
Research Focus	-0.252*** (0.081)	-0.224*** (0.080)	-0.240*** (0.080)	-0.190** (0.079)
Number of Hospitals in System (log)	0.068*** (0.021)	0.068*** (0.021)	0.065*** (0.021)	0.064*** (0.021)
Physician Ownership Status	-0.071 (0.149)	-0.091 (0.149)	-0.104 (0.148)	-0.145 (0.147)
HMO	0.085 (0.091)	0.075 (0.090)	0.082 (0.090)	0.065 (0.089)
PPO	-0.018 (0.101)	-0.015 (0.101)	-0.028 (0.100)	-0.023 (0.100)
Change in Leadership	0.056 (0.058)	0.061 (0.057)	0.043 (0.057)	0.048 (0.056)
Constant	-6.901*** (0.848)	-11.262*** (0.859)	-6.622*** (0.842)	-8.240*** (0.841)
Year Dummies	Yes	Yes	Yes	Yes
R ²	7046.40	7203.82	7488.37	7859.97
Number of Hospitals	3,319	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Table EC-20. Results with Clustered Standard Errors by HSA

Search Differentiation for HIT	A	B	C	D
Cost-Based Performance Shortfalls	1.768*** (0.192)	1.239*** (0.197)	1.526*** (0.171)	0.999*** (0.152)
Conceptualization Phase		0.316* (0.162)		
Enactment Phase			0.426*** (0.122)	
Enforcement Phase				-0.862*** (0.125)
Cost-Based Performance Shortfalls × Conceptualization Phase		0.351*** (0.068)		
Cost-Based Performance Shortfalls × Enactment Phase			0.603*** (0.051)	
Cost-Based Performance Shortfalls × Enforcement Phase				-0.727*** (0.051)
Teaching Status	-2.366*** (0.683)	-2.188*** (0.638)	-1.799*** (0.618)	-1.232** (0.518)
Nonprofit Status	1.235* (0.663)	1.067 (0.656)	1.044* (0.573)	0.582 (0.530)
Rural Location	-0.691 (0.590)	-0.658 (0.585)	-0.603 (0.557)	-0.489 (0.533)
Percent Medicare Days	-1.510*** (0.479)	-1.300*** (0.459)	-1.123** (0.457)	-0.463 (0.416)
Case Load	0.179*** (0.038)	0.152*** (0.035)	0.144*** (0.030)	0.065*** (0.021)
Financial Slack	-0.086 (0.104)	-0.045 (0.108)	-0.078 (0.088)	0.020 (0.086)
Capital Expenses (log)	0.070* (0.038)	0.036 (0.037)	0.111*** (0.034)	0.053* (0.031)
Fixed Assets (log)	-0.357*** (0.130)	-0.240** (0.118)	-0.264** (0.114)	0.036 (0.086)
Net Patient Revenue (log)	-3.006*** (0.303)	-2.330*** (0.284)	-2.570*** (0.259)	-0.872*** (0.182)
Hospital Size (log)	-0.124 (0.187)	-0.135 (0.168)	-0.130 (0.163)	-0.174 (0.132)
Physician Staffing (log)	-0.082 (0.063)	-0.071 (0.061)	-0.065 (0.052)	-0.032 (0.046)
Research Focus	-1.380*** (0.216)	-1.219*** (0.207)	-1.147*** (0.200)	-0.700*** (0.177)
Number of Hospitals in System (log)	-0.285*** (0.079)	-0.221*** (0.076)	-0.193*** (0.071)	-0.009 (0.061)
Physician Ownership Status	-0.920*** (0.308)	-0.947*** (0.304)	-0.949*** (0.287)	-1.009*** (0.282)
HMO	-0.289 (0.206)	-0.216 (0.197)	-0.271 (0.190)	-0.095 (0.174)
PPO	0.160 (0.238)	0.117 (0.230)	0.183 (0.219)	0.098 (0.201)
Change in Leadership	0.175** (0.081)	0.204** (0.079)	0.132* (0.077)	0.182** (0.072)
Constant	64.569*** (5.958)	51.395*** (5.575)	53.892*** (5.028)	20.814*** (3.473)
Year Dummies	Yes	Yes	Yes	Yes
R ²	0.112	0.133	0.198	0.280
Number of Hospitals	3,303	3,303	3,303	3,303
Number of Hospital-Year Observations	11,257	11,257	11,257	11,257

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

Table EC-21: Results Using Single Phase Baseline

Search Differentiation for HIT	A	B	C
Cost-Based Performance Shortfalls	0.982*** (0.147)	1.102*** (0.146)	0.330** (0.141)
Conceptualization Phase	Baseline	0.089 (0.157)	0.912*** (0.167)
Enactment Phase	-0.089 (0.157)	Baseline	0.823*** (0.133)
Enforcement Phase	-0.912*** (0.167)	-0.823*** (0.133)	Baseline
Cost-Based Performance Shortfalls × Conceptualization Phase		-0.120* (0.066)	0.652*** (0.068)
Cost-Based Performance Shortfalls × Enactment Phase	0.120* (0.066)		0.771*** (0.055)
Cost-Based Performance Shortfalls × Enforcement Phase	-0.652*** (0.068)	-0.771*** (0.055)	
Teaching Status	-1.268** (0.518)	-1.268** (0.518)	-1.268** (0.518)
Nonprofit Status	0.556 (0.471)	0.556 (0.471)	0.556 (0.471)
Rural Location	-0.492 (0.521)	-0.492 (0.521)	-0.492 (0.521)
Percent Medicare Days	-0.485 (0.410)	-0.485 (0.410)	-0.485 (0.410)
Case Load	0.066*** (0.021)	0.066*** (0.021)	0.066*** (0.021)
Financial Slack	0.013 (0.087)	0.013 (0.087)	0.013 (0.087)
Capital Expenses (log)	0.054* (0.030)	0.054* (0.030)	0.054* (0.030)
Fixed Assets (log)	0.030 (0.085)	0.030 (0.085)	0.030 (0.085)
Net Patient Revenue (log)	-0.932*** (0.190)	-0.932*** (0.190)	-0.932*** (0.190)
Hospital Size (log)	-0.176 (0.131)	-0.176 (0.131)	-0.176 (0.131)
Physician Staffing (log)	-0.031 (0.045)	-0.031 (0.045)	-0.031 (0.045)
Research Focus	-0.703*** (0.168)	-0.703*** (0.168)	-0.703*** (0.168)
Number of Hospitals in System (log)	-0.016 (0.059)	-0.016 (0.059)	-0.016 (0.059)
Physician Ownership Status	-1.036*** (0.284)	-1.036*** (0.284)	-1.036*** (0.284)
HMO	-0.089 (0.173)	-0.089 (0.173)	-0.089 (0.173)
PPO	0.082 (0.201)	0.082 (0.201)	0.082 (0.201)
Change in Leadership	0.173** (0.072)	0.173** (0.072)	0.173** (0.072)
Constant	22.057*** (3.611)	21.968*** (3.620)	21.145*** (3.619)
R ²	0.281	0.281	0.281
Number of Hospitals	3,319	3,319	3,319
Number of Hospital-Year Observations	11,316	11,316	11,316

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

We evaluated three additional model specifications with each phase as the baseline, as reported in Table EC-20. In Model A, the conceptualization phase is the baseline; in Model B, the enactment phase is the baseline; and in Model C, the enforcement phase is the baseline. Using this approach allowed us to alternatively isolate a baseline phase and evaluate the interaction terms against one baseline phase. Overall, all three models produced very similar results supporting H2a and H2b, as explained next.

In Model A, we included cost-based performance shortfalls \times enactment phase and cost-based performance shortfalls \times enforcement phase. In comparison with the cost-based performance shortfalls in the baseline conceptualization phase ($\beta = 0.982, p < 0.01$), we found cost-based performance shortfalls \times enactment phase to be statistically significant and positive ($\beta = 0.120, p < 0.1$), cost-based performance shortfalls \times enforcement phase to be statistically significant and negative ($\beta = -0.652, p < 0.01$), and both are statistically different from each other (Chi-square = 2.920, $p < 0.1$), which is consistent with the main results. Thus, the effect of cost-based performance shortfalls on search differentiation for HIT in the baseline conceptualization phase is smaller than that of the enactment phase ($0.120 > 0$) and is greater than that of the enforcement phase ($-0.652 < 0$)—namely, the effect increases from the conceptualization phase to the enactment phase (H2a) and decreases from the enactment phase to the enforcement phase (H2b).

In Model B, we included cost-based performance shortfalls \times conceptualization phase and cost-based performance shortfalls \times enforcement phase. In comparison with cost-based performance shortfalls in the baseline enactment phase ($\beta = 1.102, p < 0.01$), we found cost-based performance shortfalls \times conceptualization phase to be statistically significant and negative ($\beta = -0.120, p < 0.1$), cost-based performance shortfalls \times enforcement phase to be statistically significant and negative ($\beta = -0.771, p < 0.01$), and both are statistically different from each other (Chi-square = 210.010, $p < 0.01$), which is consistent with the main results. Thus, the effect of cost-based performance shortfalls on search differentiation for HIT in the baseline enactment phase is greater than that of the conceptualization phase and the enforcement phase ($-0.120 < 0$ and $-0.771 < 0$) while the effect in the conceptualization phase is *relatively* greater than that of the enforcement phase ($-0.120 > -0.771$)—namely, the effect increases from the conceptualization phase to the enactment phase (H2a) and decreases from the enactment phase to the enforcement phase (H2b).

In Model C, we included cost-based performance shortfalls \times conceptualization phase and cost-based performance shortfalls \times enactment phase. In comparison with cost-based performance shortfalls in the baseline enforcement phase ($\beta = 0.330, p < 0.05$), we found cost-based performance shortfalls \times conceptualization phase to be statistically significant and positive ($\beta = 0.652, p < 0.01$), cost-based performance shortfalls \times enactment phase to be statistically significant and positive ($\beta = 0.771, p < 0.01$), and both are statistically different from each other (Chi-square = 101.190, $p < 0.01$), which is again consistent with the main results. Thus, the effect of cost-based performance shortfalls on search differentiation for HIT in the baseline enforcement phase is smaller than that of the conceptualization phase and the enactment phase ($0.652 > 0$ and $0.771 > 0$) while the effect in the conceptualization phase is *relatively* smaller than that of the enactment phase ($0.652 < 0.771$)—namely, the effect increases from the conceptualization phase to the enactment phase (H2a) and decreases from the enactment phase to the enforcement phase (H2b).

Table EC-22: Results Using Previous Phase Baseline

Search Differentiation for HIT	A	B
Cost-Based Performance Shortfalls	0.302*** (0.086)	0.757*** (0.049)
Conceptualization Phase	Baseline	Excluded
Enactment Phase	-0.669*** (0.164)	Baseline
Enforcement Phase	Excluded	-2.517*** (0.088)
Cost-Based Performance Shortfalls × Enactment Phase	0.107* (0.062)	
Cost-Based Performance Shortfalls × Enforcement Phase		-0.842*** (0.036)
Teaching Status	-0.278 (0.267)	-0.126 (0.142)
Nonprofit Status	0.642*** (0.204)	0.864*** (0.101)
Rural Location	0.268 (0.197)	0.284*** (0.102)
Percent Medicare Days	-0.242 (0.295)	0.085 (0.148)
Case Load	-0.017 (0.013)	-0.016** (0.007)
Financial Slack	0.002 (0.011)	0.027 (0.075)
Capital Expenses (log)	0.093** (0.046)	0.068*** (0.021)
Fixed Assets (log)	0.478*** (0.081)	0.224*** (0.037)
Net Patient Revenue (log)	0.733*** (0.131)	0.357*** (0.061)
Hospital Size (log)	0.187*** (0.053)	0.200*** (0.028)
Physician Staffing (log)	0.042 (0.042)	-0.012 (0.020)
Research Focus	-0.163 (0.160)	-0.093 (0.079)
Number of Hospitals in System (log)	0.112*** (0.039)	0.050** (0.020)
Physician Ownership Status	-0.396 (0.338)	-0.102 (0.140)
HMO	0.055 (0.172)	0.063 (0.089)
PPO	-0.223 (0.194)	0.069 (0.099)
Change in Leadership	0.087 (0.115)	0.020 (0.056)
Constant	2.939*** (0.434)	2.929*** (0.227)
Number of Hospitals	2,530	3,152
Number of Hospital-Year Observations	4,431	9,523

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Robust standard errors in parentheses.

We evaluated additional model specifications with the previous phase as the baseline, as reported in Table EC-21. In Model A, the enactment phase is a dummy variable which is equal to one if a given year falls into the enactment phase and 0 if a given year falls into the conceptualization phase; the enforcement phase is excluded. In Model B, the enforcement phase is a dummy variable which is equal to one if a given year falls into the enforcement phase and 0 if a given year falls into the enactment phase; the conceptualization phase is excluded. Using this approach allowed us to alternatively isolate the previous phase as the baseline phase and evaluate the interaction terms against the previous phase, while excluding the other phase from consideration. Overall, all models produced very similar results supporting H2a and H2b.