

e - c o m p a n i o n

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Electronic Companion—"Privacy Protection and Technology Diffusion:
The Case of Electronic Medical Records" by Amalia R. Miller and
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Data Processing and Robustness Checks

EC.1. Data Processing

The HADB database gives data on 4,010 hospitals. Of these, we have records on 3,988 hospitals' decisions on whether to adopt an enterprise-wide EMR system. Adoption of EMR was reported by 1,937 hospitals. Of these, 1,400 hospitals reported the timing of their adoption of EMR. Since we need information about the timing of adoption to exploit time-series variation in state privacy protection, we dropped the 537 observations where no information about timing was provided.¹⁸

The annual American Hospital Survey covers over 6,000 hospitals. We matched these to the HADB database using Medicare ID numbers where available and names and cities where not. We were able to match all but 193 of our the hospitals in the HADB database. The hospitals we could not match were largely hospitals that were split into two campuses in the HADB database but reported as a single campus in the AHA database. In all, we were left with 2,935 observations, of which 25 had missing AHA data so were dropped. This left us with 2,910 observations for our regressions. The hospitals that were not matched were smaller than those that were. Table EC.1 contains the statistics for hospitals in our sample and hospitals that we could not match with the HADB technology adoption data. These unmatched hospitals had 110 beds as compared to 210 beds for the matched hospitals. They also spent \$17 million on total payroll as compared with \$47 million for the matched hospitals. Forty percent of the unmatched hospitals reported they were part of a healthcare system, compared with 68% of the matched hospitals. These unmatched hospitals were also far less likely to be part of a HMO network. They also saw fewer Medicare and Medicaid patients. Given that adoption decisions are positively correlated with these variables, in particular those concerning the hospital's size, it seems likely that if we did have data on these unmatched hospitals they would have adopted EMR less than those we study. Although we cannot sign the bias with certainty of our results, it seems likely that our study understates the impact of privacy protection on EMR adoption because the omitted hospitals are less likely to adopt, and

¹⁸ Results where we look at adoption in 2005 show little change whether we include or exclude these 537 observations.

Table EC.1 The hospitals in our sample are larger than average.

Variable	Hospitals not in HADB sample		Hospitals in HADB sample	
	Mean	(Std. Dev.)	Mean	(Std. Dev.)
Independent Practice Association	0.09	(0.28)	0.12	(0.33)
Member System	0.40	(0.49)	0.68	(0.47)
Member Network	0.28	(0.45)	0.36	(0.48)
Total Payroll (USD)	16,987,224.3	(35,140,008.07)	46,657,465.8	(60,041,420)
Staffed Beds (000)	109.54	(164.44)	209.7	(185.02)
Nursing Home Unit	0.17	(0.38)	0.28	(0.45)
Total Outpatients	62,222.82	(131,345.36)	143,481.27	(173,601.1)
Births (000)	179.48	(621.72)	1,043.73	(1,370.26)
Medicare Patients	766.91	(1,636.51)	3,725.22	(3,523.8)
Medicaid Patients	312.53	(871.34)	1,585.57	(2,103.75)
HMO	0.04	(0.2)	0.16	(0.37)
Fee for Service	0.02	(0.15)	0.06	(0.23)
PPO	0.08	(0.27)	0.2	(0.4)

more likely to transfer patients. In any case, our results should be interpreted as a study of how larger hospitals react to state privacy protection.

EC.2. Legal Context

EC.2.1. Text of State Disclosure Law

There are many regulations that cover the disclosure of health information. These regulations vary in how much they limit the disclosure of medical information, the range of covered organizations, the rules for obtaining consent, the exemptions from disclosure rules, and the penalties for violations. They generally apply to all medical information, paper or electronic, irrespective of format. The disclosure laws explicitly protect the confidentiality of information by limiting the rights of hospitals to share information about patients without their prior authorization. Requirements to protect the *security* of private medical information from unauthorized access (such as medical identity theft, accidental disclosure, or inappropriate disclosure) may be implicit in the confidentiality rules or explicitly mandated by state statute. In this paper we simply divide states by whether they have regulation that limits the disclosure of information by hospitals. However, the following extracts for the state law pertaining to disclosure by hospitals in Florida and New Hampshire show that the laws are not always worded the same and that each state law has its own nuances. For example, the New Hampshire law explicitly includes electronic records while the Florida law refers to health records in more general terms. Also, the Florida state law explicitly allows facility personnel and attending physicians within that hospital to access the records without written consent, while the New Hampshire law requires written consent for all releases of information except those required

by law. This suggests there may be slight differences across states in the stand-alone benefits for the use of EMR within a hospital. Such differences are controlled for in the specifications that contain state or hospital FE, and the similarity of the results for cross-sectional and panel results suggests that they are not overly important.

Health Disclosure Rules for Hospitals in Florida 1em

Hospitals and licensed entities are subject to restrictions on disclosure of patient records and information similar to those applicable to health practitioners. [Fla. Stat.5 Ann. §395.3025.] In general their patient records may not be disclosed without the patients consent, except under the circumstances specified in the statute. [Id.] These include: to licensed facility personnel and attending physicians for use in connection with the treatment of the patient; to licensed facility personnel for administrative purposes or risk management and quality assurance functions; pursuant to a subpoena in any civil or criminal action, unless otherwise prohibited by law; and to various state agencies and other entities for purposes specified in the statute. [Id.] The Health Department is explicitly authorized to examine a licensed facility's patient records, whether held by the facility or the Agency for Health Care Administration, to conduct epidemiological investigations. [Id.] Recipients of information lawfully disclosed may use it only for the purpose for which it was provided and may not further disclose it, except upon the written consent of the patient. [Id.] A general authorization for the release of medical information does not authorize re-disclosure. [Id.]

Pritts et al. (2002) summary of <http://www.leg.state.fl.us>.

Explicit Health Security Rules for Hospitals in Florida 1em

All "records owners," i.e., any health care practitioner who generates a medical record, receives medical records from a previous record owner, or the practitioner's employer, if the employer is designated as the records owner, [Fla. Stat. Ann. §456.057(1) (defining "records owner.")] are required to develop and implement policies, standards and procedures to protect the confidentiality and security of medical records. Employees of the record owners must be trained in these policies,

standards and procedures [Fla. Stat. Ann. §456.057(9)]. In addition, record owners must maintain a record of all disclosures of information in a medical record to a third party, including the purpose of the disclosure request. [Id.]

Pritts et al. (2002) summary of <http://www.leg.state.fl.us>.

Health Disclosure Rules for Hospitals in New Hampshire 1em

A patient of a health facility must be ensured confidential treatment of all information contained in the patients personal and clinical record, including that stored in an automatic data bank. [N.H. Rev. Stat. §151:21(X).] The patient's written consent is required for the release of information to anyone not otherwise authorized by law to receive it. [Id.] This provision applies to any licensed hospital, infirmary or health service maintained by an educational institution, laboratory performing tests or analyses of human samples, outpatient rehabilitation clinic, ambulatory surgical center, hospice, emergency medical care center, drop-in or walk-in care center, dialysis center, birthing center, or other entity where health care associated with illness, injury, deformity, infirmity, or other physical disability is provided, whether operated for profit, for free or at a reduced cost, and others. [N.H. Rev. Stat. §§151:19 (defining "facility"); 151:2 (detailing facilities that must be licensed).]

Pritts et al. (2002) summary of <http://gencourt.state.nh.us/ns>.

EC.2.2. Penalties for Violating State Privacy Law

We describe the penalties for breaking the state law below. On face value, they do not appear particularly harsh. Conversations with IT professionals suggest, however, that hospital IT departments are eager to ensure their IT systems fully comply with state law as the potential harm from negative publicity is far greater than that implied by state statute.

Remedies and Penalties in Florida 1em

Fines and Penalties. Unauthorized disclosure of any information that would identify an individual by agents of the Health Department is a misdemeanor of the first degree, punishable as specified by statute. [Id.]

Pritts et al. (2002) summary of <http://www.leg.state.fl.us>.

Fines and Penalties in New Hampshire 1em

A facility that violates this provision is liable for the sum of 50 USD for each violation per day or part of a day or for all damages proximately caused by the violations, whichever is greater. [Id.] If a facility is found to be in contempt of a court order issued under this section, the facility is liable for the plaintiffs reasonable attorney fees and costs. [Id.]

Pritts et al. (2002) summary of <http://gencourt.state.nh.us/ns>.

EC.2.3. HIPAA

Another significant change between 1996 and 2005 is the introduction of the Federal Privacy Rule in 2003 stemming from the 1996 HIPAA law.¹⁹ Although HIPAA provides a uniform minimum standard of federal privacy protection for *documenting* how health information is used, actual standards about usage continued to vary from state to state. For example, under HIPAA, consumers can request medical records but a health provider can refuse to provide them as long as they provide justification. Although HIPAA requires that entities maintain “reasonable and appropriate” data safeguards, this standard is often weaker than state requirements. HIPAA is further weakened by its dependence on consumer complaints to initiate actions. In our panel estimates, HIPAA’s effect on the level of adoption is captured by a series of national-level time dummies. For robustness, we repeated our estimation separately for before and after the introduction of HIPAA. Reassuringly, our results did not qualitatively change. However, this does mean that our estimates measure the incremental effect of state privacy protection beyond existing federal regulation.

EC.2.4. Breakdown of Covariates by Privacy Law

Table EC.2 describes the differences in our regression covariates by state privacy law. The most noticeable difference is that total payroll for hospitals is substantially higher in states that have privacy laws, while hospital size measured in beds is only slightly higher. A close inspection of Figure 2, however, suggests that this is probably reflective of generally higher wages in the states that have privacy laws.

¹⁹ Sections 261 through 264.

Table EC.2 Summary statistics by privacy law.

	No privacy law		Privacy law	
EMR Adoption	0.39	(0.49)	0.43	(0.49)
ICU Adoption	0.22	(0.41)	0.21	(0.41)
Independent Practice Association	0.10	(0.3)	0.17	(0.37)
Physician Hospital Organization	0.31	(0.46)	0.28	(0.44)
Fully Integrated Organization	0.30	(0.45)	0.22	(0.41)
Member System	0.62	(0.48)	0.66	(0.47)
Member Network	0.36	(0.48)	0.31	(0.46)
Total Payroll (USDm)	39.3	(54.68)	48.49	(60.32)
Staffed Beds (000)	0.18	(0.17)	0.21	(0.18)
Nursing Home Unit	0.31	(0.46)	0.27	(0.44)
Total Outpatients (000)	13.23	(16.49)	14.24	(16.78)
Births (000)	0.83	(1.14)	1.13	(1.47)
Medicare Patients (000)	3.40	(3.46)	3.7	(3.3)
Medicaid Patients (000)	1.29	(1.67)	1.72	(2.34)
HMO	0.16	(0.37)	0.16	(0.37)
Fee for Service	0.06	(0.24)	0.05	(0.22)
PPO	0.23	(0.42)	0.18	(0.38)
Population HSA	0.68	(0.99)	2.10	(3.23)
Income Median HSA (000)	23.35	(5.42)	26.79	(8.32)
Medicare HSA	0.10	(0.15)	0.27	(0.43)

EC.3. Robustness Checks

EC.3.1. “Do Not Call” Sign-ups as “Privacy” Instruments

Varian et al. (2005) exhaustively report the various correlates of households signing up for the “Do Not Call” list. Of these, they report that the most significant are county-level education, race, income, and age. These are not significant correlates of hospital EMR adoption. In fact, as shown in Table 2, higher HSA household income actually has an insignificant and negative effect on technology adoption, as opposed to the positive and significant effect it has on sign-ups to the “Do Not Call” registry. Population density has an ambiguous effect on sign-ups for the “Do Not Call” list. Urban clusters have high sign-up rates, but farming communities have the highest sign-up rate. Table EC.3 shows how hospital and demographic characteristics vary by whether or not there are high or low “Do Not Call” sign-ups.

Table EC.3 Summary statistics by level of DNC.

	Low “Do Not Call” Sign-up	High “Do Not Call” Sign-up
EMR Adoption	0.4 (0.49)	0.42 (0.49)
ICU Adoption	0.22 (0.41)	0.21 (0.41)
Independent Practice Association	0.11 (0.31)	0.17 (0.37)
Physician Hospital Organization	0.32 (0.46)	0.26 (0.43)
Fully Integrated Organization	0.26 (0.44)	0.25 (0.43)
Member System	0.64 (0.48)	0.65 (0.47)
Member Network	0.34 (0.47)	0.31 (0.46)
Total Payroll (USDm)	36.41 (51.76)	52.82 (62.93)
Staffed Beds (000)	0.18 (0.16)	0.22 (0.19)
Nursing Home Unit	0.31 (0.46)	0.26 (0.44)
Total Outpatients (000)	12.16 (15.31)	15.49 (17.79)
Births (000)	0.82 (1.18)	1.18 (1.47)
Medicare Patients (000)	3.23 (3.21)	3.93 (3.5)
Medicaid Patients (000)	1.28 (1.73)	1.8 (2.37)
HMO	0.16 (0.37)	0.16 (0.37)
Fee for Service	0.06 (0.24)	0.05 (0.21)
PPO	0.23 (0.42)	0.17 (0.38)



Figure EC.1 Boundaries of HSA.

EC.4. HSA Geographical Reach

EC.5. Full Specifications

Table EC.4 Hospitals considering adopting EMR respond differently to the EMR installed base in states that have privacy laws and those that do not.

Model	States with no privacy law			States with privacy law		
	1	2	3	4	5	6
Data	Panel	Panel	Cross-sectional	Panel	Panel	Cross-sectional
Hospital fixed effects	Yes	Yes	No	Yes	Yes	No
Instrumental variables	No	Yes	Yes	No	Yes	Yes
<i>InstalledHSA</i>	0.025*** (0.005)	0.023** (0.009)	0.071* (0.039)	0.013*** (0.004)	-0.009 (0.011)	0.007 (0.046)
Year 2002	0.126*** (0.014)	0.128*** (0.016)		0.174*** (0.013)	0.196*** (0.016)	
Year 2005	0.158*** (0.016)	0.161*** (0.019)		0.199*** (0.015)	0.243*** (0.025)	
Numb Hospitals HSA	0.004 (0.021)	0.006 (0.021)	-0.030 (0.021)	-0.019** (0.009)	0.025 (0.022)	-0.003 (0.019)
No Out-of-Reg. System Hosp	-0.022 (0.051)	-0.023 (0.051)	-0.011** (0.004)	-0.040** (0.018)	-0.043** (0.019)	-0.011*** (0.002)
Academic (d)			0.073 (0.070)			0.121* (0.065)
Years Opened			0.001*** (0.000)			0.001*** (0.000)
Independent Practice Association (d)			0.113** (0.047)			-0.012 (0.034)
Physician Hospital Organization (d)			0.015 (0.032)			-0.015 (0.029)
Fully Integrated Organization (d)			-0.061*** (0.031)			-0.003 (0.031)
Member System			0.060* (0.034)			0.013 (0.030)
Member Network			-0.044 (0.031)			-0.011 (0.030)
Total Payroll (USDm)			-0.002** (0.001)			-0.001** (0.001)
Staffed Beds (000)			0.409 (0.256)			0.142 (0.166)
Nursing Home Unit (d)			-0.037 (0.033)			-0.004 (0.030)
Total Outpatients (000)			0.004** (0.002)			0.003** (0.001)
Births (000)			0.031 (0.019)			0.004 (0.014)
Medicare Patients (000)			-0.004 (0.010)			0.007 (0.007)
Medicaid Patients (000)			0.000 (0.016)			-0.005 (0.010)
HMO (d)			-0.057 (0.045)			0.048 (0.045)
Fee for Service (d)			0.045 (0.068)			0.037 (0.066)
PPO (d)			0.043 (0.044)			0.041 (0.044)
Population HSA			0.016 (0.093)			0.009 (0.034)
Income Median HSA (000)			-0.008** (0.004)			0.001 (0.003)
Medicare HSA			0.073 (0.794)			-0.089 (0.200)
Observations	2,811	2,367	1,281	4,328	3,446	1,654
Log-Likelihood	1,027.173	661.266	-2,904.155	1,020.762	390.880	-4,418.995
Significance of first-stage regressions						
LM Statistic		341.762	33.847		258.924	43.121
P-Value		0.000	0.000		0.000	0.000

Linear probability model estimates reported for panel. Probit GMM estimates for cross-section reported as marginal effects calculated at mean. (d) indicates that the marginal effect is calculated as the discrete change in y as the dummy variable changes from 0 to 1. Test statistics for cross-sectional data calculated for identically specified linear probability model to ensure comparability. Robust standard errors reported in parentheses below estimate: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table EC.5 Hospital's considering adopting ICU IT do not respond differently to the EMR installed base in states that have privacy laws and those that do not.

Model	States with no privacy law			States with privacy law		
	1	2	3	4	5	6
Data	Panel	Panel	Cross-sectional	Panel	Panel	Cross-sectional
Hospital fixed effects	Yes	Yes	No	Yes	Yes	No
Instrumental variables	No	Yes	Yes	No	Yes	Yes
<i>InstalledHSA</i>	-0.001 (0.004)	-0.015* (0.008)	-0.024 (0.033)	0.006** (0.003)	-0.015* (0.009)	0.018 (0.040)
Year 2002	0.058*** (0.012)	0.072*** (0.014)		0.088*** (0.011)	0.110*** (0.014)	
Year 2005	0.125*** (0.013)	0.144*** (0.016)		0.169*** (0.013)	0.212*** (0.022)	
Numb Hospitals HSA	0.004 (0.017)	0.014 (0.018)	0.011 (0.017)	-0.002 (0.008)	0.041** (0.019)	-0.009 (0.016)
No Out-of-Reg. System Hosp	-0.016 (0.042)	-0.017 (0.043)	-0.024*** (0.005)	-0.009 (0.016)	-0.013 (0.016)	0.001 (0.002)
Academic (d)			0.175** (0.070)			-0.034 (0.054)
Years Opened			0.000 (0.000)			0.000 (0.000)
Independent Practice Association (d)			-0.039 (0.040)			-0.058* (0.030)
Physician Hospital Organization (d)			0.004 (0.029)			0.041 (0.027)
Fully Integrated Organization (d)			0.001 (0.028)			-0.007 (0.028)
Member System			0.048 (0.030)			0.005 (0.028)
Member Network			-0.018 (0.028)			0.027 (0.028)
Total Payroll (USDm)			-0.001 (0.001)			0.000 (0.000)
Staffed Beds (000)			-0.043 (0.242)			0.049 (0.149)
Nursing Home Unit (d)			0.036 (0.030)			-0.033 (0.027)
Total Outpatients (000)			-0.000 (0.001)			0.001 (0.001)
Births (000)			-0.017 (0.017)			0.012 (0.012)
Medicare Patients (000)			0.012 (0.009)			0.016** (0.007)
Medicaid Patients (000)			0.022 (0.014)			-0.010 (0.009)
HMO (d)			0.053 (0.044)			0.080* (0.043)
Fee for Service (d)			-0.044 (0.055)			-0.033 (0.056)
PPO (d)			0.121*** (0.042)			0.022 (0.041)
Population HSA			-0.149* (0.085)			0.043 (0.032)
Income Median HSA (000)			0.002 (0.003)			-0.002 (0.002)
Medicare HSA			0.677 (0.697)			-0.243 (0.184)
Observations	2,811	2,367	1,281	4,328	3,446	1,654
Log-Likelihood	1,539.726	1,082.533	-2,811.233	1,617.413	858.285	-4,343.334
	Significance of first-stage regressions					
LM Statistic		341.762	33.847		258.924	43.121
P-Value		0.000	0.000		0.000	0.000

Linear probability model estimates reported for panel. Probit GMM estimates for cross-section reported as marginal effects calculated at mean. (d) indicates that the marginal effect is calculated as the discrete change in y as the dummy variable changes from 0 to 1. Test statistics for cross-sectional data calculated for identically specified linear probability model to ensure comparability. Robust standard errors reported in parentheses below estimate: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table EC.6 Hospital's considering adopting ICU do not respond in same manner as those considering adopting EMR in states that have privacy laws and those that do not.

Model	States with no privacy law			States with privacy law		
	1	2	3	4	5	6
Data	Panel	Panel	Cross-sectional	Panel	Panel	Cross-sectional
Hospital fixed effects	Yes	Yes	No	Yes	Yes	No
Instrumental variables	No	Yes	Yes	No	Yes	Yes
False <i>InstalledHSA</i>	0.024*** (0.008)	-0.145 (0.133)	0.098 (0.138)	0.015*** (0.004)	-0.017* (0.011)	0.036 (0.036)
Year 2002	0.051*** (0.011)	0.092*** (0.035)		0.088*** (0.011)	0.103*** (0.012)	
Year 2005	0.108*** (0.013)	0.217** (0.086)		0.157*** (0.013)	0.210*** (0.021)	
Numb Hospitals HSA	-0.011 (0.018)	0.094 (0.085)	-0.033 (0.046)	-0.012* (0.007)	0.037** (0.017)	-0.012 (0.011)
No Out-of-Reg. System Hosp	-0.012 (0.042)	-0.041 (0.054)	-0.020*** (0.008)	-0.008 (0.016)	-0.013 (0.016)	0.001 (0.002)
Academic (d)			0.146 (0.091)			-0.022 (0.050)
Years Opened			0.001 (0.000)			0.000 (0.000)
Independent Practice Association (d)			-0.060 (0.042)			-0.057* (0.030)
Physician Hospital Organization (d)			0.011 (0.029)			0.037 (0.028)
Fully Integrated Organization (d)			-0.003 (0.030)			-0.002 (0.028)
Member System			0.045 (0.031)			-0.008 (0.029)
Member Network			-0.000 (0.036)			0.038 (0.027)
Total Payroll (USDm)			-0.001 (0.001)			-0.000 (0.000)
Staffed Beds (000)			0.069 (0.270)			0.086 (0.156)
Nursing Home Unit (d)			0.033 (0.031)			-0.040 (0.028)
Total Outpatients (000)			-0.001 (0.001)			0.001 (0.001)
Births (000)			-0.019 (0.018)			0.012 (0.011)
Medicare Patients (000)			0.011 (0.010)			0.014** (0.007)
Medicaid Patients (000)			0.021 (0.014)			-0.009 (0.008)
HMO (d)			0.036 (0.050)			0.085** (0.043)
Fee for Service (d)			-0.018 (0.074)			-0.047 (0.055)
PPO (d)			0.090 (0.057)			0.031 (0.039)
Population HSA			0.115 (0.377)			0.004 (0.053)
Income Median HSA (000)			0.002 (0.003)			0.000 (0.002)
Medicare HSA			-0.665 (2.176)			-0.025 (0.301)
Observations	2,811	2,367	1,281	4,328	3,446	1,654
Log-Likelihood	1,549.415	748.085	-2,705.857	1,631.138	840.155	-4,251.985
	Significance of first-stage regressions					
LM Statistic		6.334	13.807		250.865	61.339
P-Value		0.096	0.003		0.000	0.000

Linear probability model estimates reported for panel. Probit GMM estimates for cross-section reported as marginal effects calculated at mean. (d) indicates that the marginal effect is calculated as the discrete change in y as the dummy variable changes from 0 to 1. Test statistics for cross-sectional data calculated for identically specified linear probability model to ensure comparability. Robust standard errors reported in parentheses below estimate: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table EC.7 Hospital's considering adopting EMR respond negatively to state privacy laws.

Model	EMR adoption			Placebo test		
	1	2	3	4	5	6
Data	Panel	Panel	Cross-sectional	Panel	Panel	Cross-sectional
Hospital fixed effects	Yes	Yes	No	Yes	Yes	No
Instrumental variables	No	Yes	Yes	No	Yes	Yes
<i>HospPrivLaw</i> (d)	0.015 (0.014)	-0.110*** (0.041)	-0.240* (0.138)	0.030*** (0.011)	0.061* (0.034)	-0.107 (0.151)
Year 2002	0.202*** (0.008)	0.185*** (0.010)		0.098*** (0.007)	0.103*** (0.008)	
Year 2005	0.220*** (0.009)	0.203*** (0.011)		0.173*** (0.008)	0.178*** (0.009)	
Numb Hospitals HSA	0.011** (0.005)	0.013*** (0.005)	0.001 (0.001)	0.012*** (0.004)	0.012*** (0.004)	0.001 (0.001)
No Out-of-Reg. System Hosp	-0.024*** (0.003)	-0.023*** (0.003)	-0.005*** (0.001)	-0.016*** (0.003)	-0.017*** (0.003)	-0.002*** (0.000)
Academic (d)			0.065 (0.043)			0.045 (0.041)
Years Opened			0.001*** (0.000)			0.000 (0.000)
Independent Practice Association (d)			0.056** (0.028)			-0.042 (0.027)
Physician Hospital Organization (d)			-0.015 (0.021)			0.014 (0.020)
Fully Integrated Organization (d)			-0.061*** (0.022)			-0.022 (0.022)
Member System			0.068*** (0.022)			0.032 (0.021)
Member Network			-0.041** (0.020)			-0.001 (0.019)
Total Payroll (USDm)			-0.001*** (0.000)			-0.001* (0.000)
Staffed Beds (000)			0.347*** (0.132)			0.073 (0.124)
Nursing Home Unit (d)			-0.049** (0.021)			-0.014 (0.020)
Total Outpatients (000)			0.003*** (0.001)			0.000 (0.001)
Births (000)			0.015 (0.010)			0.010 (0.010)
Medicare Patients (000)			-0.001 (0.006)			0.014*** (0.006)
Medicaid Patients (000)			0.003 (0.007)			0.002 (0.007)
HMO (d)			-0.024 (0.031)			0.049 (0.030)
Fee for Service (d)			0.024 (0.045)			-0.043 (0.039)
PPO (d)			0.034 (0.031)			0.050* (0.029)
Observations	7,139	6,524	2,935	7,139	6,524	2,935
Log-Likelihood	1,269.401	826.707	-3,810.283	2,481.290	1,985.335	-3,684.737
Joint-significance of first stage variables						
LM Statistic		472.304	44.169		472.304	44.169
<i>P</i> -Value		0.000	0.000		0.000	0.000

Dependent variable: whether hospital has installed enterprise EMR. Test statistics for cross-sectional data calculated for identically specified linear probability model to ensure comparability. Probit GMM estimates for cross-section reported as marginal effects calculated at mean. (d) indicates that the marginal effect is calculated as the discrete change in y as the dummy variable changes from 0 to 1. Robust standard errors reported in parentheses below estimate: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table EC.8 The interaction between state privacy laws and the installed base is negative.

Model	1	2
Correlation structure	Independent	Unstructured
Instruments	Cross-sectional and time-varying	Cross-sectional and time-varying
<i>HospPrivLaw</i> (d)	-0.021 (0.057)	0.008 (0.057)
<i>InstalledHSA</i>	0.049*** (0.011)	0.047*** (0.011)
<i>HospPrivLaw* InstalledHSA</i>	-0.029*** (0.011)	-0.030*** (0.011)
Academic (d)	0.026 (0.021)	0.028 (0.021)
Years Opened	0.001*** (0.000)	0.001*** (0.000)
Numb Hospitals HSA	-0.008*** (0.002)	-0.007*** (0.002)
No Out-of-Reg. System Hosp	-0.002*** (0.000)	-0.002*** (0.000)
Independent Practice Association (d)	-0.002 (0.012)	-0.002 (0.012)
Physician Hospital Organization (d)	-0.002 (0.010)	-0.001 (0.010)
Fully Integrated Organization (d)	-0.006 (0.011)	-0.006 (0.011)
Member System	0.035*** (0.010)	0.034*** (0.010)
Member Network	-0.007 (0.010)	-0.008 (0.010)
Total Payroll (USDm)	0.000* (0.000)	0.000* (0.000)
Staffed Beds (000)	0.110* (0.065)	0.115* (0.065)
Nursing Home Unit	-0.021** (0.010)	-0.022** (0.010)
Total Outpatients (000)	0.001*** (0.000)	0.001*** (0.000)
Births (000)	0.003 (0.005)	0.003 (0.005)
Medicare Patients (000)	-0.001 (0.003)	-0.002 (0.003)
Medicaid Patients (000)	-0.001 (0.004)	-0.001 (0.004)
HMO (d)	-0.024* (0.013)	-0.023* (0.013)
Fee for Service (d)	-0.049*** (0.018)	-0.049*** (0.018)
PPO (d)	0.024* (0.013)	0.025** (0.013)
Observations	7,086	7,086
Log-Likelihood	-3.85 × 10 ⁴	-4.13 × 10 ⁴
	Excluded first-stage installed base variables	
Prop Other Hosp MultiHSA	0.269*** (0.011)	0.269*** (0.011)
Proportion IPA in HSA	-0.916*** (0.188)	-0.896*** (0.188)
	Excluded first-stage privacy law variables	
Proportion Rep Upper State House	-5.972*** (0.424)	-5.893*** (0.424)
Proportion Dem Upper State House	-6.335*** (0.424)	-6.259*** (0.424)
Proportion Rep Lower State House	1.255* (0.745)	1.169 (0.745)
Proportion Dem Lower State House	1.945*** (0.747)	1.863** (0.747)

Table continued on next page.

Table EC.8 Continued.

Model	1	2
	Excluded first-stage installed base privacy law interaction variables	
Prop Other Hosp MultiHSA	20.025*** (0.869)	28.513*** (1.074)
Proportion IPA in HSA	-66.581*** (18.737)	-86.605*** (23.183)
Proportion Rep Upper State House	-34.505*** (3.386)	-45.186*** (4.096)
Proportion Dem Upper State House	-34.470*** (3.390)	-44.744*** (4.102)
Proportion Rep Lower State House	50.478*** (5.682)	61.614*** (6.858)
Proportion Dem Lower State House	49.487*** (5.690)	59.334*** (6.867)
Prop MultiHSA * Rep Upper	0.868*** (0.290)	3.370*** (0.359)
Prop MultiHSA * Dem Upper	0.957*** (0.304)	3.299*** (0.359)
Prop MultiHSA * Rep Lower	-21.347*** (0.826)	-32.556*** (1.022)
Prop MultiHSA * Dem Lower	-20.827*** (0.804)	-31.755*** (0.995)
Prop IPA * Rep Upper	84.215*** (8.450)	110.705*** (10.517)
Prop IPA * Dem Upper	84.982*** (8.600)	111.886*** (10.641)
Prop IPA * Rep Lower	-19.702 (17.701)	-26.682 (21.901)
Prop IPA * Dem Lower	-17.102 (17.755)	-22.178 (21.969)

Panel data from 1996–2005. State-level and Year fixed effects. Multiple unreported Hospital Level and HSA level controls. Dependent variable: whether hospital has installed enterprise EMR by that year. 3SLS linear probability model. Robust standard errors reported in parentheses below estimate: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.