Managers and Public Hospital Performance

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January 20, 2023

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  - 75% of medical beds are publicly provided in OECD ‣ Why public providers?

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   - CEO transitions from no management training to management training $\rightarrow$ drop in mortality

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Outline

1. **Setting, data, and descriptive evidence**
2. Impact on hospital performance
3. Impact on CEO characteristics
4. Skills mismatch and organizational performance
5. Role of financial incentives

Selection reform

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  - aimed at improving efficiency and effectiveness of government institutions
  - in public agencies across all public sector
  - to be implemented in top managerial positions

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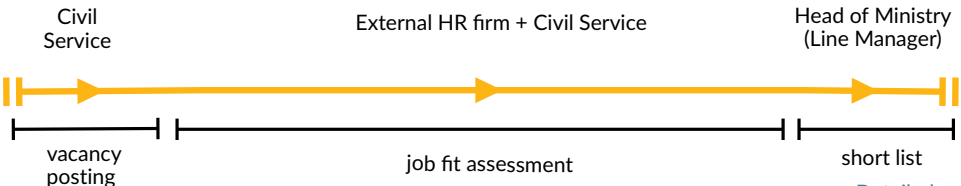

▸ Detailed process

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- **After:** public and transparent competitive recruiting process
- Reform also included financial incentives
  - (i) Higher wages in the form of a monthly unconditional bonus
  - (ii) Performance pay incentives: only trivial penalty based on past performance

▸ Details

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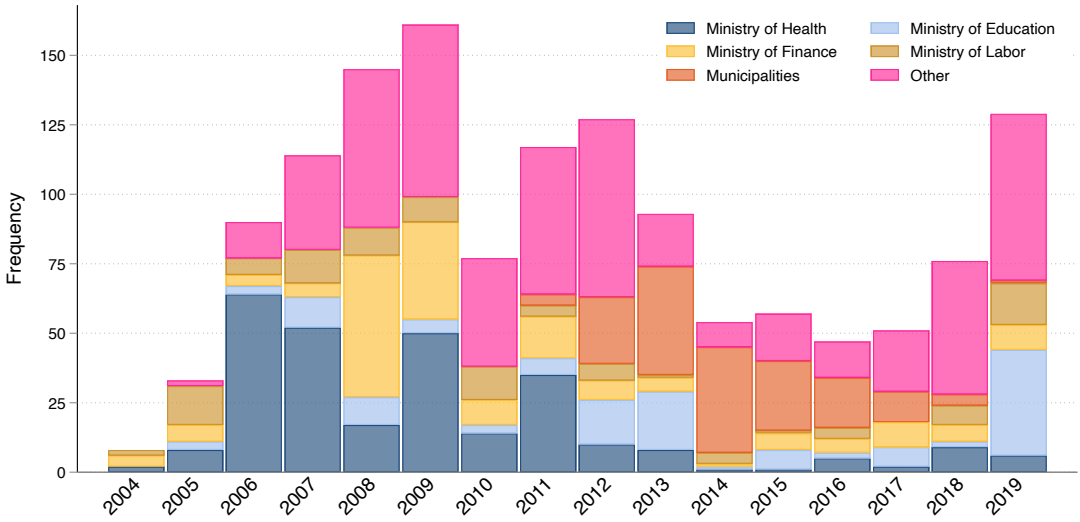
  - new selection process requires a transition of incumbent manager

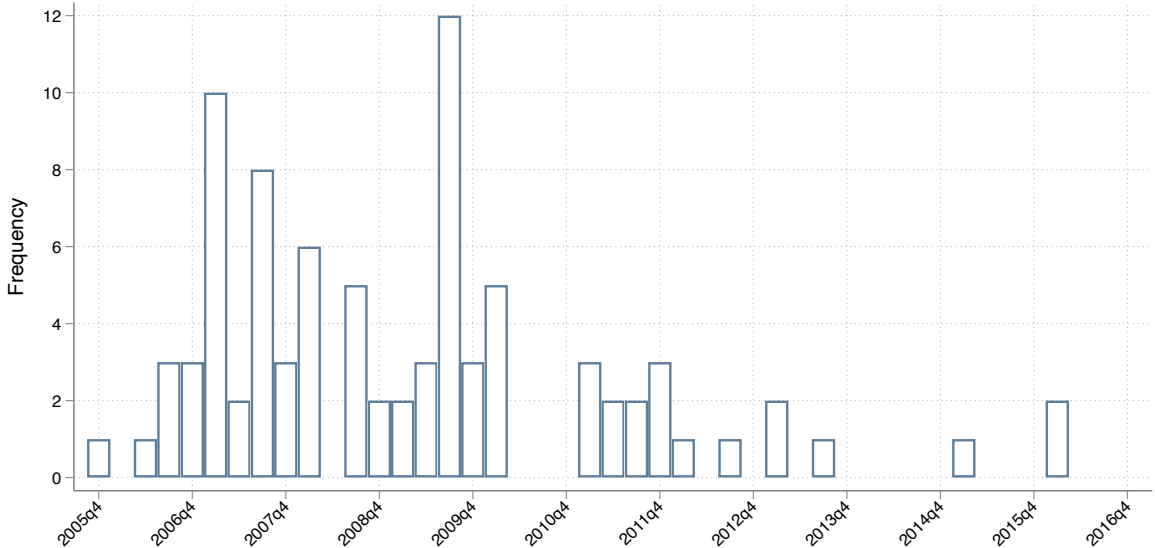
Public agencies gradually adopted selection reform ▸ # by year



Number of public agencies using the new recruitment process for the **first time**

Public hospitals adopting the reform

‣ CDF ‣ By hospital size



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- Healthcare system is effective and well organized ‣ Figures
  (OECD 2019)

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Data description

▸ Details ▸ Descriptive Stats

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4. Skills mismatch and organizational performance
5. Role of financial incentives

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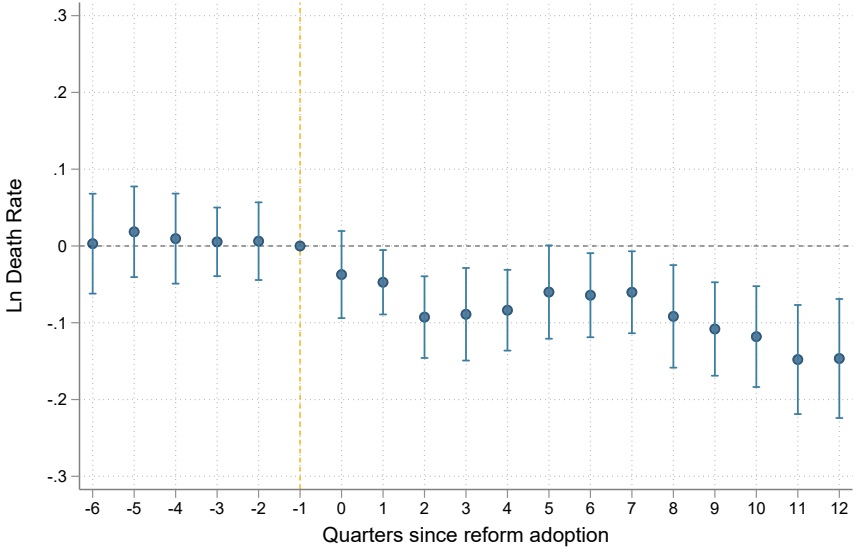
- **Identifying assumption:** parallel trends in absence of the policy

▸ Supporting evidence

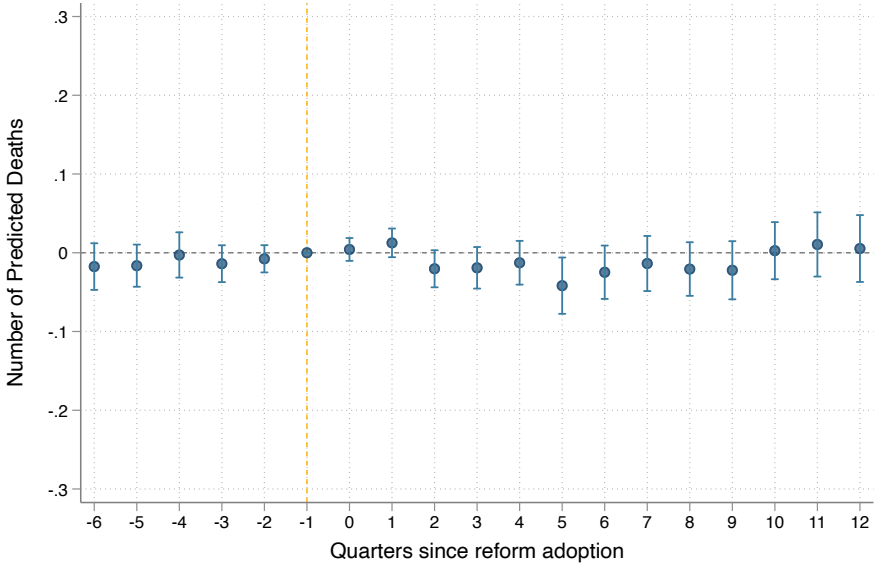
Impact on hospital performance

▸ Readmission ▸ Other outcomes ▸ Robustness

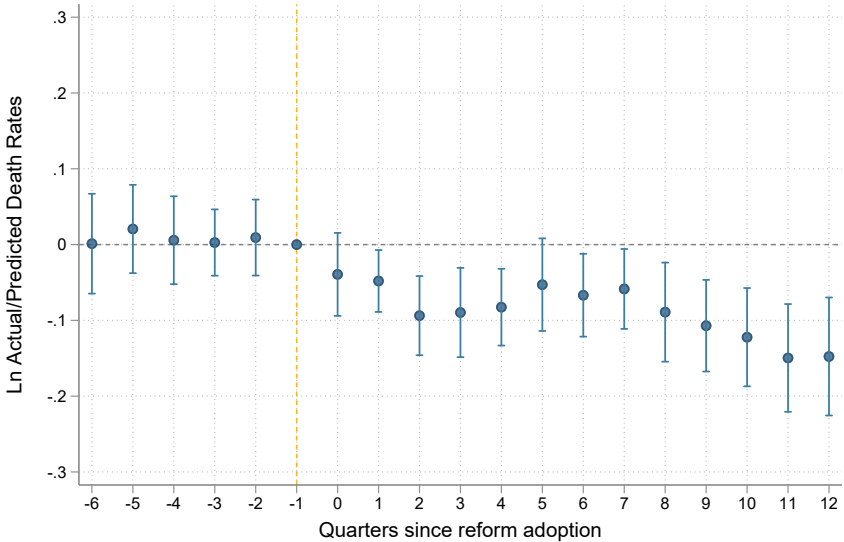


Patient risk doesn't change after adoption

▸ Procedure ▸ Past diagnosis ▸ Death rate

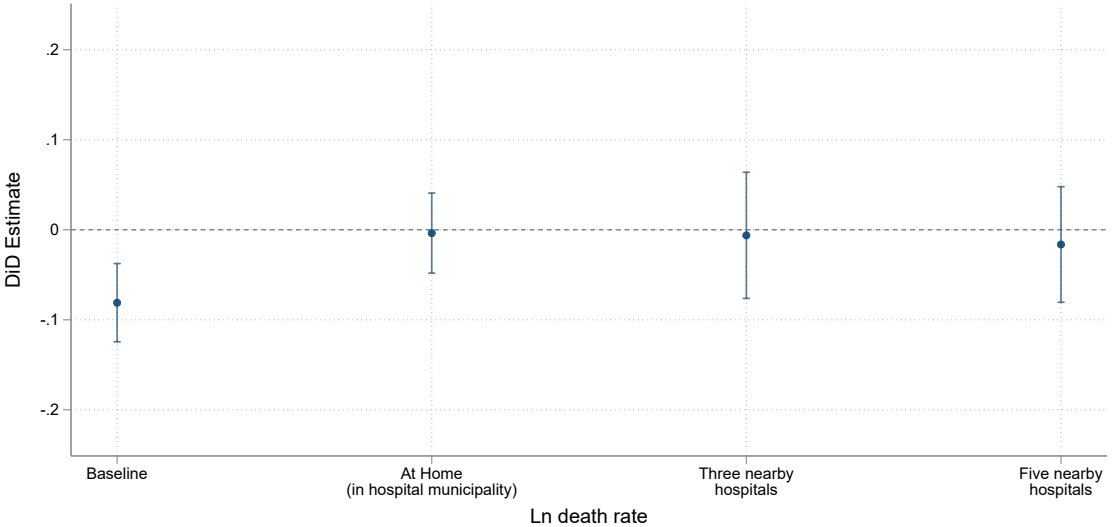


Results are robust for risk-adjusted mortality outcomes



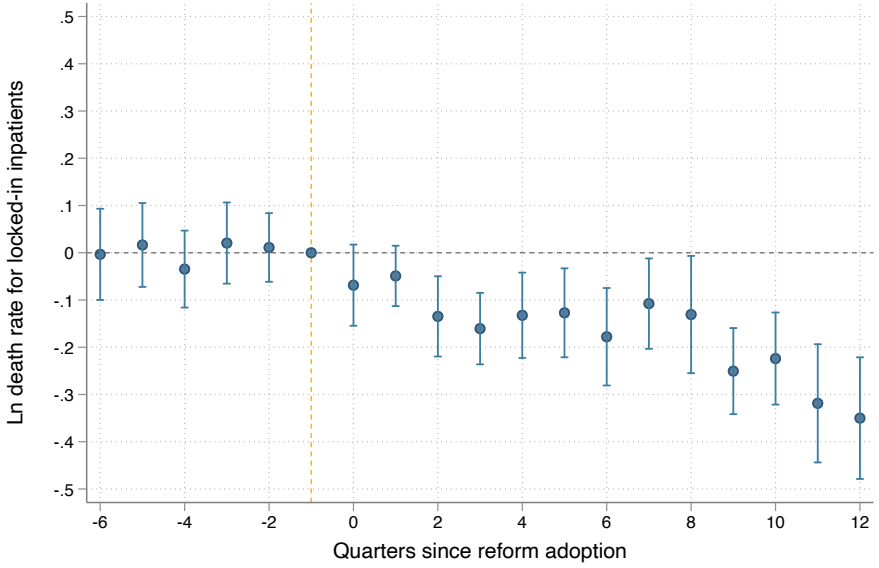
- Emergent cases

No evidence of supply-side unobserved selection



No evidence of unobserved patient sorting: locked-in patients

▸ Strict



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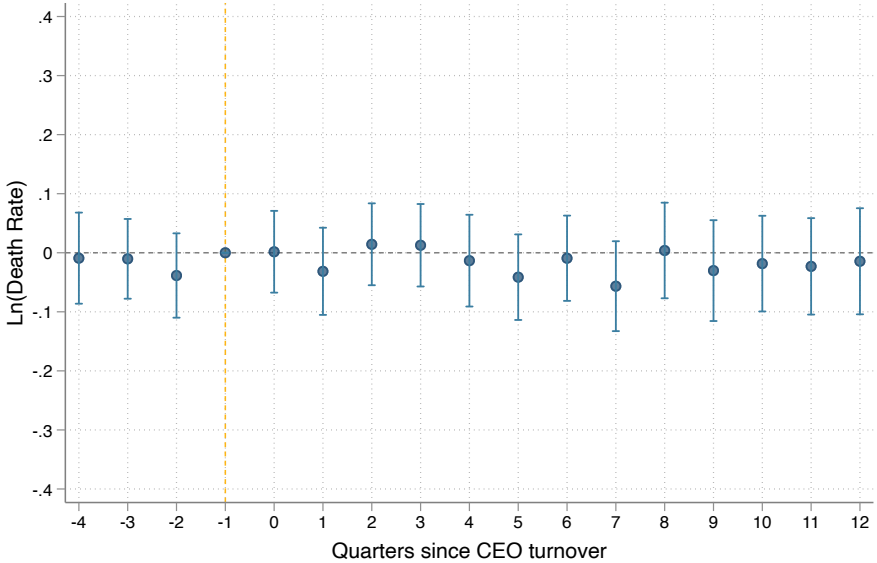
No evidence of impacts on hospital performance

‣ Stacked main figure



What practices may explain the reduction in hospital mortality?

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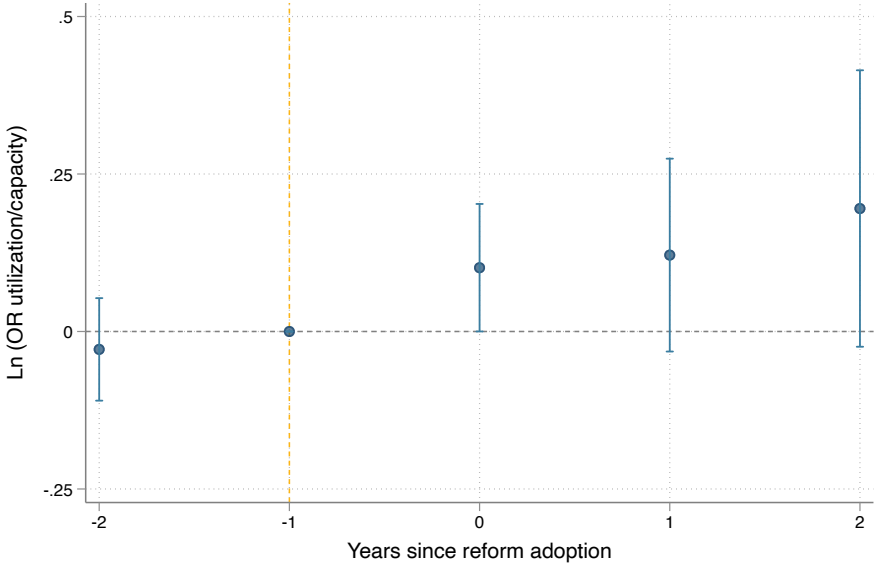
- Management practices positively associated with
  - lower hospital mortality (McConnell et al. 2013; Tsai et al. 2015; Bloom et al. 2020)
  - lower length of stay, infection rates, waiting lists (Bloom et al. 2015)
  - reduced staff turnover (Bloom et al. 2015; Bender et al. 2018; Hoffman & Tadelis 2021)

Reform induced more efficient utilization of operating room



Correlation with other performance metrics

‣ Waiting lists (prelim)

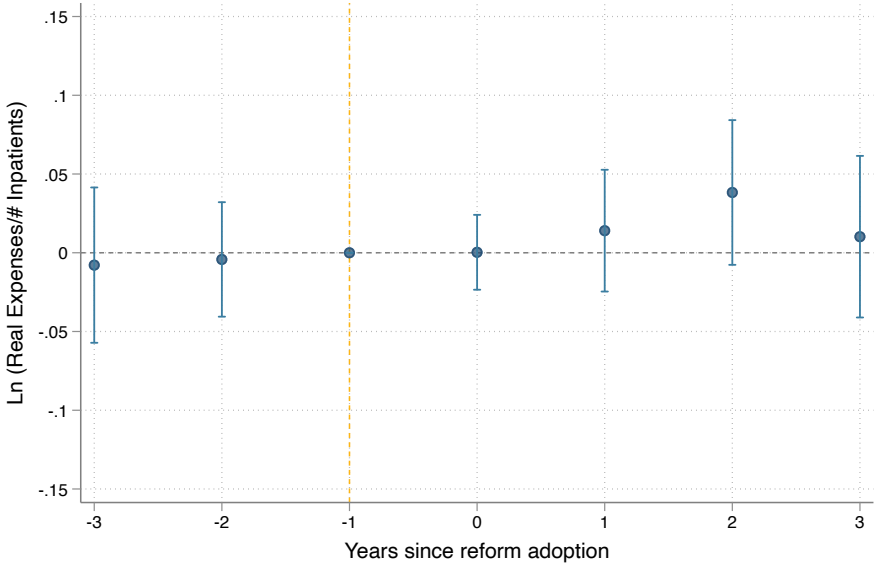
	(1) Ln Length of Stay	(2) Ln infection rate	(3) Ln surgery rate	(4) Ln amenable surgery rate
1 if reform adopted in hospital	-0.030*	-0.044*	0.094	0.264*
	(0.016)	(0.025)	(0.133)	(0.153)
Observations	2,229	2,217	418	330
R-squared	0.801	0.756	0.433	0.753
Time FE	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes
# of Hospitals	185	184	67	62
Mean Dep. Variable	3.38	12.81	29.43	1.46

Reduced high-skilled worker turnover

	(1) Physician	(2) Specialist	(3) Nurses	(4) Technicians
1 if reform adopted in hospital	-0.063*	-0.070**	0.004	0.014
	(0.034)	(0.034)	(0.018)	(0.015)
Observations	794	624	794	794
R-squared	0.412	0.311	0.318	0.501
Time FE	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes
# of Hospitals	112	107	112	112
Mean Dep. Variable	0.16	0.17	0.09	0.06
Data Period	$\geq$ 2011	$\geq$ 2011	$\geq$ 2011	$\geq$ 2011

▸ Figure ▸ No effect on personnel wages

Reform didn't increase patient spending



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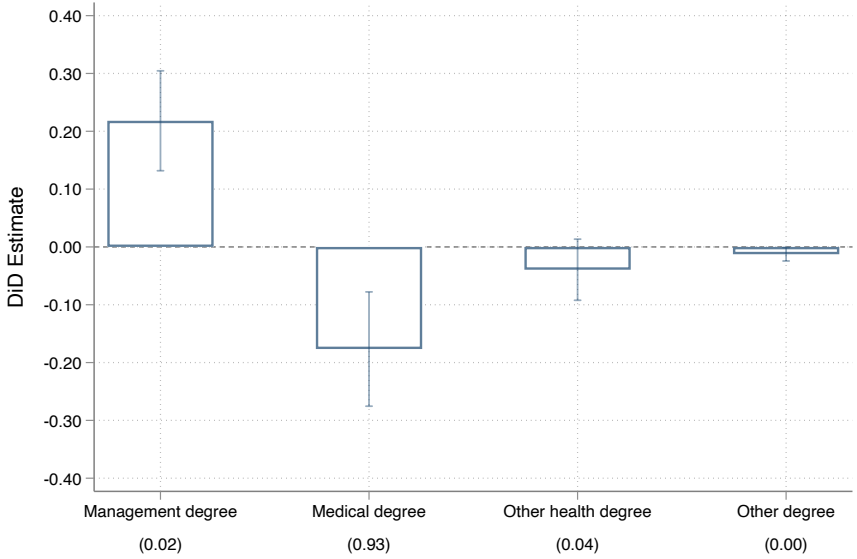
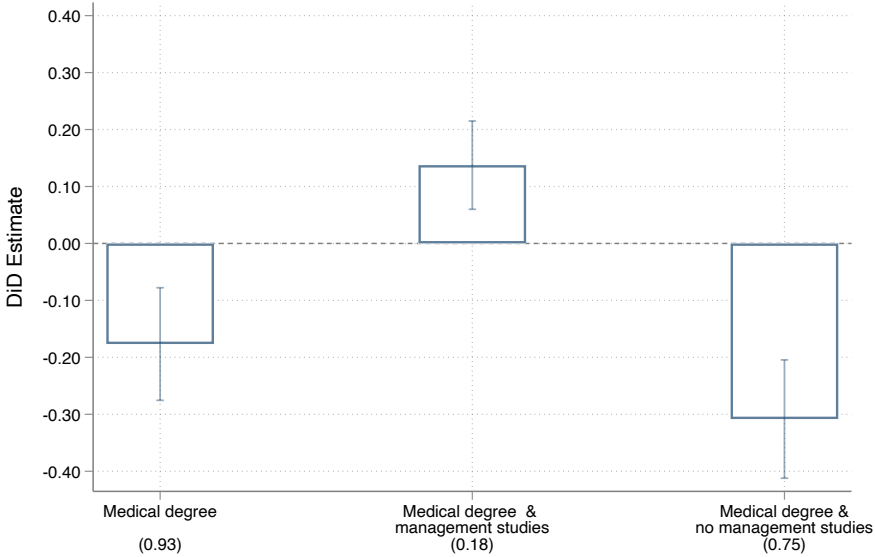
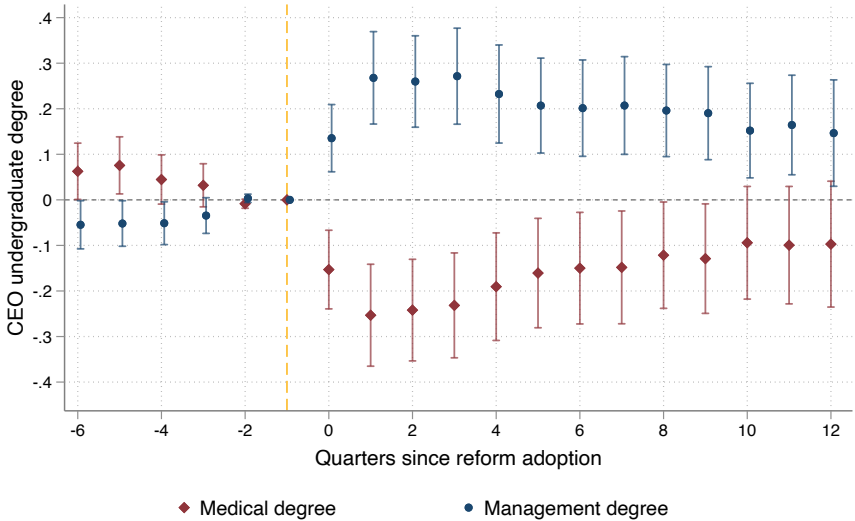
Reform displaced doctor CEOs



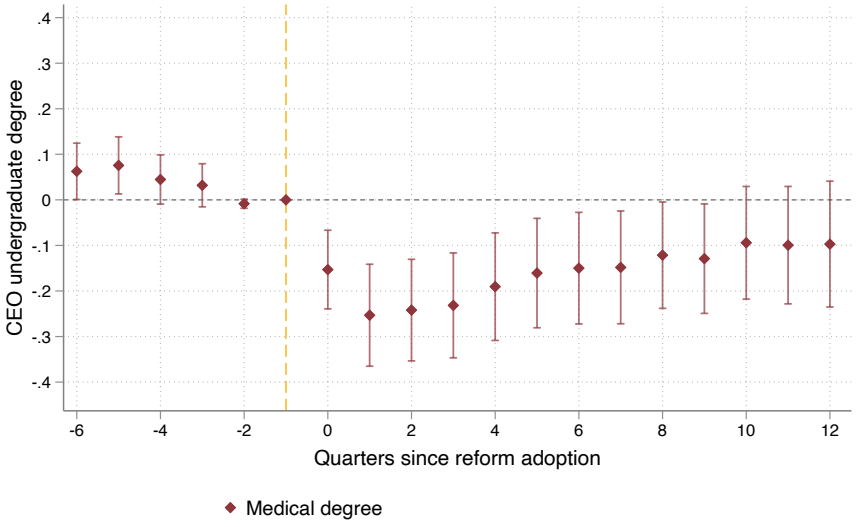
... but only those with no managerial qualifications



Doctor CEOs displaced by CEOs with mgmt. undergrad.

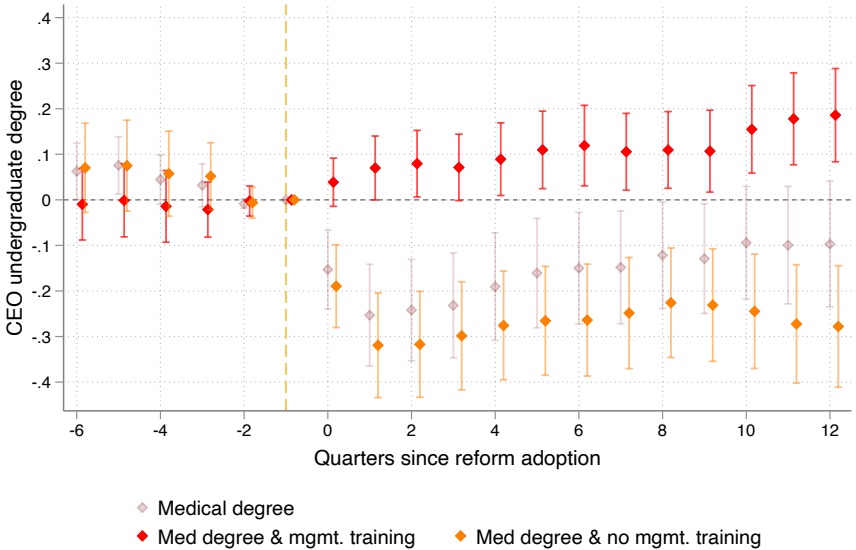


Doctor CEOs gradually recover from initial displacement

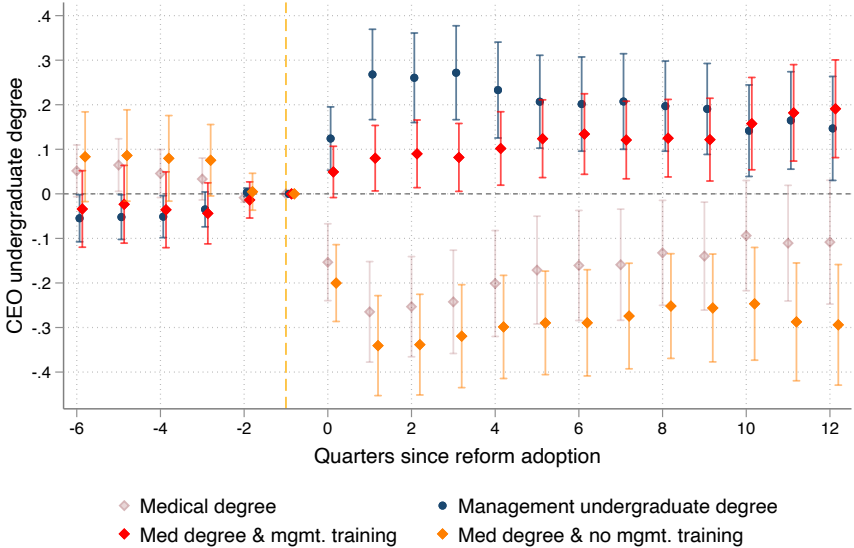


Reform increases doctor CEOs w/ mgmt. training

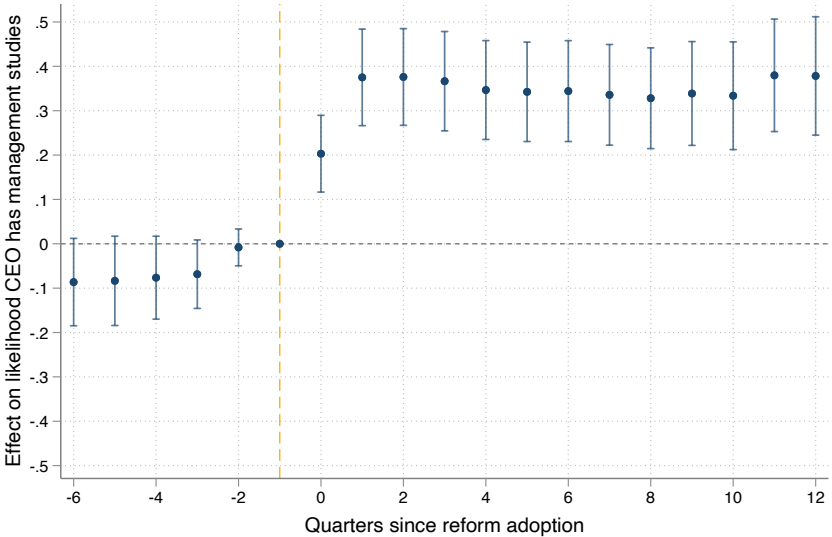
▸ Avg. effect



Doctor CEOs w/ mgmt. training partially revert initial hit



CEOs more likely to have mgmt. training after reform



Reform incentivized doctors to study management

▸ Highlight

Training & Career

MBA in health for Chilean doctors to enter the world of management

The Universidad Mayor and UNAB offer hospital management programs.

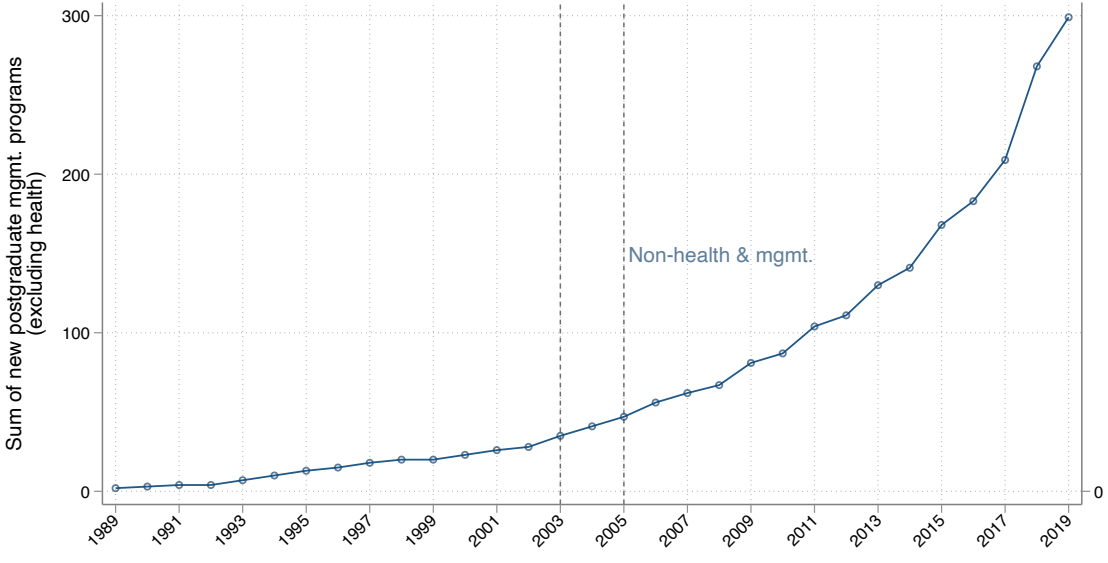
Autor: AméricaEconomía.com | November 12, 2010

Some Chilean universities offer an MBA in Health, so that their graduates can work in administrative positions such as managers or directors of hospitals and even Seremis.

One of the institutions offered by this MBA with a specialization in Health is the Andrés Bello University (Unab), which allows students to acquire and deepen subjects such as economics, administration, marketing, epidemiology applied to management and clinical management.

Unab has made 21 versions of this program since 2005, and its success is based on its realization in several cities of the country, from Iquique to Punta Arenas, in hotels and hospitals, with more than 500 graduates, according to the newspaper La Tercera.

Reform incentivized doctors to study management



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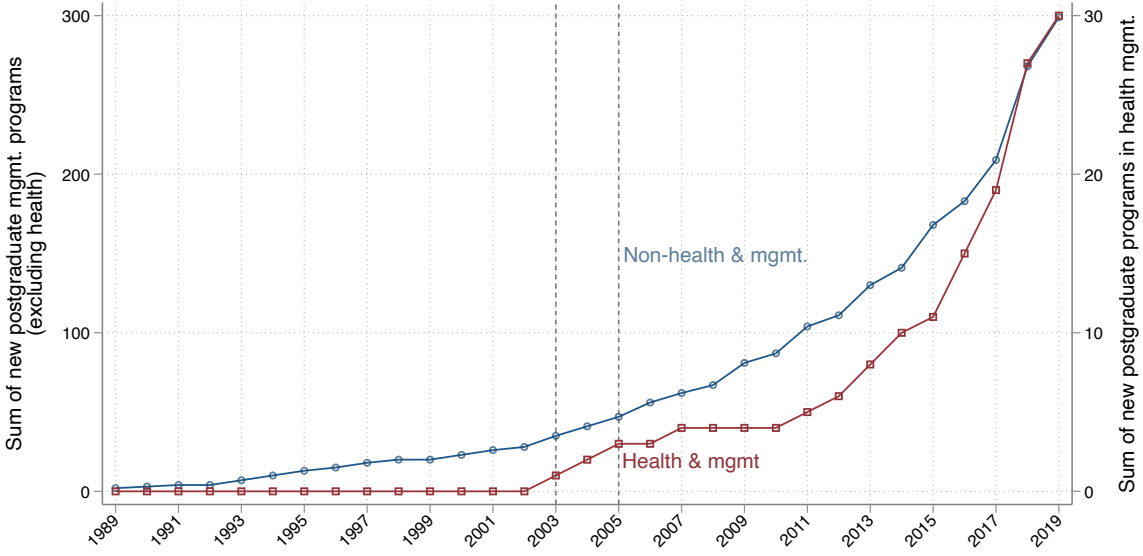

Effect of the reform on managers' skills and demographics

	Skills				Demographics	
	CEO Fixed Effect	Avg. Test Score	Math Specific Exam	Science Specific Exam	Age	Female
	(1)	(2)	(3)	(4)	(5)	(6)
1 if reform adopted	-0.09***	-0.12	0.08	-0.13**	-1.87*	-0.03
	(0.03)	(0.10)	(0.08)	(0.05)	(1.06)	(0.05)
Observations	4,391	7,053	5,561	5,561	7,906	8,085
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No	No
# of Hospitals	111	177	162	162	180	180
Mean Dep. Variable	0.570	2.000	0.740	0.990	50.190	0.210

Outline

1. Setting, data, and descriptive evidence
2. Impact on hospital performance
3. Impact on CEO characteristics
4. **Skills mismatch and organizational performance**
5. Role of financial incentives

Which skills matter for CEO performance?

1. Reform increased non-doctor professional CEOs

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> *"the ideal place for the engineer is as an advisor to a doctor CEO. The engineering vision is super positive and necessary for organizing finances, indicators, goals, etc., but they have a very large information asymmetry with the medical team. A doctor can tell the non-medical CEO 'you don't understand this, you can't comment' and that's it."*

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3. Reform increased CEOs with bundle of skills

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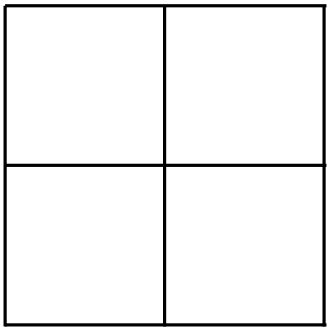
3. Reform increased CEOs with bundle of skills $\rightarrow \Delta^{+}$ (management training & medical training)

Which skills matter for CEO performance?

- Reform impacted CEOs skills on two dimensions



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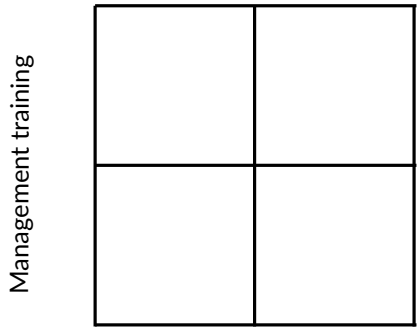

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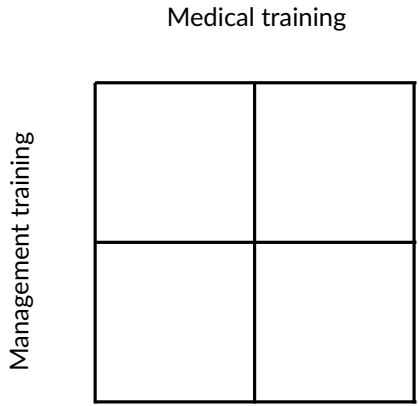

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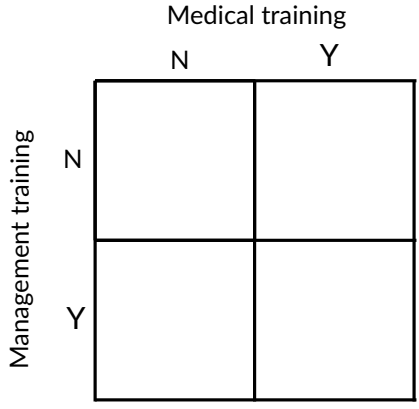

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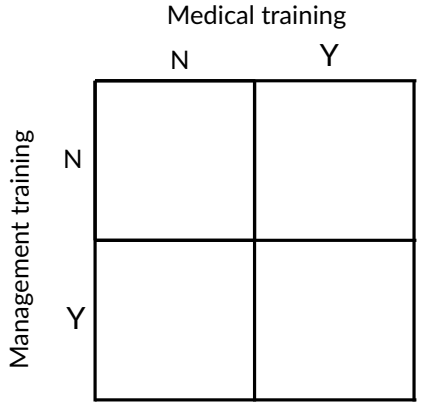

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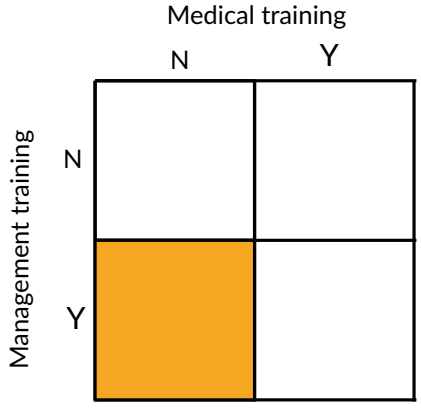

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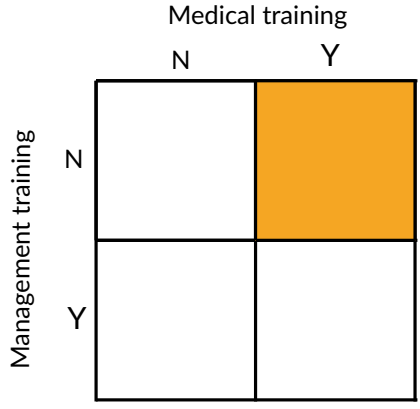

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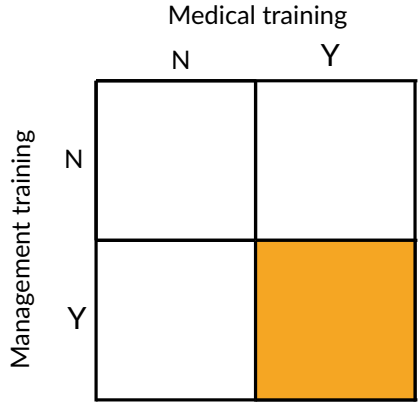

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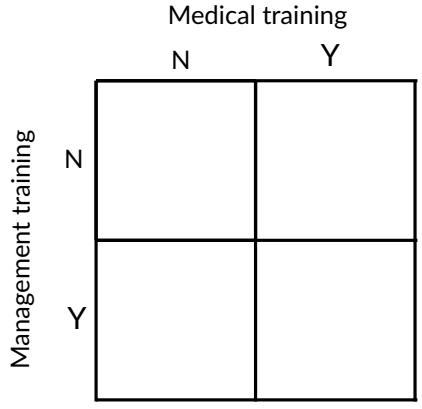

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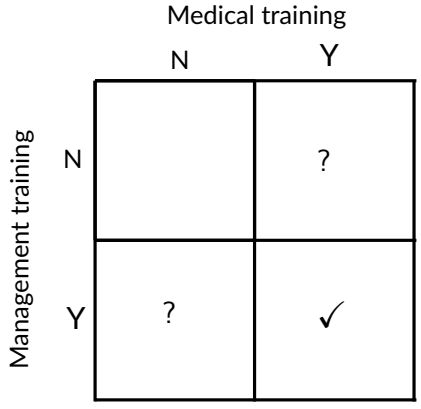

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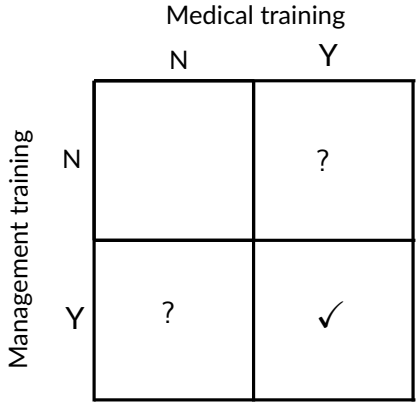
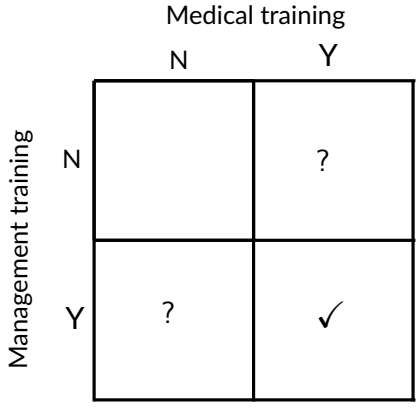
- Which skills matter for performance?
  - several factors create skill mismatches in public sector



Which skills matter for CEO performance?

- Reform impacted CEOs skills on two dimensions

- Which skills matter for performance?
  - several factors create skill mismatches in public sector
  - limited research of impact in public sector
    (Nordin et al. 2010; Besley et al. 2022)



Which skills matter for performance? ▸ CEO experience

	Ln Death Rate (%)
	(1)
Reform	-0.076***
	(0.022)
Reform & no mgmt. training	
Reform & mgmt. training	
Reform & mgmt. & no medical training	
Reform & mgmt. & medical training	
Sample	All
Observations	8,085
Time & Hospital FE	Yes
Case mix	Yes
Mean Dep. Variable	2.63

Which skills matter for performance? ▸ CEO experience

	Ln Death Rate (%)	
	(1)	(2)
Reform	-0.076***	
	(0.022)	
Reform & no mgmt. training		-0.019
		(0.026)
Reform & mgmt. training		-0.107***
		(0.023)
Reform & mgmt. & no medical training		
Reform & mgmt. & medical training		
Sample	All	All
Observations	8,085	8,085
Time & Hospital FE	Yes	Yes
Case mix	Yes	Yes
Mean Dep. Variable	2.63	2.63
p value *Mgmt.* = *Non Mgmt.*		0.00

Which skills matter for performance? ▸ CEO experience

	Ln Death Rate (%)		
	(1)	(2)	(3)
Reform	-0.076***		
	(0.022)		
Reform & no mgmt. training		-0.019	-0.017
		(0.026)	(0.027)
Reform & mgmt. training		-0.107***	-0.104***
		(0.023)	(0.024)
Reform & mgmt. & no medical training			
Reform & mgmt. & medical training			
Sample	All	All	
Observations	8,085	8,085	5,738
Time & Hospital FE	Yes	Yes	Yes
Case mix	Yes	Yes	Yes
Mean Dep. Variable	2.63	2.63	2.49
p value *Mgmt. = Non Mgmt.*		0.00	0.00

Which skills matter for performance? ▸ CEO experience

	Ln Death Rate (%)			
	(1)	(2)	(3)	(4)
Reform	-0.076***			
	(0.022)			
Reform & no mgmt. training		-0.019	-0.017	-0.019
		(0.026)	(0.027)	(0.026)
Reform & mgmt. training		-0.107***	-0.104***	
		(0.023)	(0.024)	
Reform & mgmt. & no medical training				-0.099***
				(0.027)
Reform & mgmt. & medical training				-0.112***
				(0.027)
Sample	All	All	Doctor CEOs	All
Observations	8,085	8,085	5,738	8,085
Time & Hospital FE	Yes	Yes	Yes	Yes
Case mix	Yes	Yes	Yes	Yes
Mean Dep. Variable	2.63	2.63	2.49	2.63
p value *Mgmt. = Non Mgmt.*		0.00	0.00	

Is mgmt. training a good predictor of performance?

- Are findings specific to the reform?

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$$y_{hte} = \alpha_{he} + \gamma_{te} + \sum_{k=-4}^{12} \beta_k D_{hte}^k + \epsilon_{hte}$$

  - event e: any CEO transition in hospital h at time t (exclude reform's transitions)

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  - control group for event e: hospitals w/o transitions in time window

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  1. no mgmt. training $\rightarrow$ mgmt. training

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  1. no mgmt. training → mgmt. training
  2. no mgmt. training → no mgmt. training

Is mgmt. training a good predictor of performance?

	Ln Death (%) (1)	Ln Death (%) (2)
no mgmt. training → mgmt. training	-0.072***	
	(0.025)	
no mgmt. training → no mgmt. training		-0.010
		(0.022)
Observations	71,027	193,177
Time FE	Yes	Yes
Hospital FE	Yes	Yes
Case Mix	Yes	Yes
Mean Dep. Variable	2.88	2.41

▸ No pre trends

Outline

1. Setting, data, and descriptive evidence
2. Impact on hospital performance
3. Impact on CEO characteristics
4. Skills mismatch and organizational performance ▸ Skip
5. **Role of financial incentives**

Role of financial incentives

- Reform included performance pay and higher wages

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  - performance pay explains trivial part of wage and not binding ▸ Evidence

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⇒ Financial incentives do not drive mortality results of the reform

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  → Chancellor/Dean in universities

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  - even if candidates rise up from the lower ranks of their respective professions

Comments and feedback

cotero@berkeley.edu

Appendix

Why a public provider in healthcare? ▸ Back

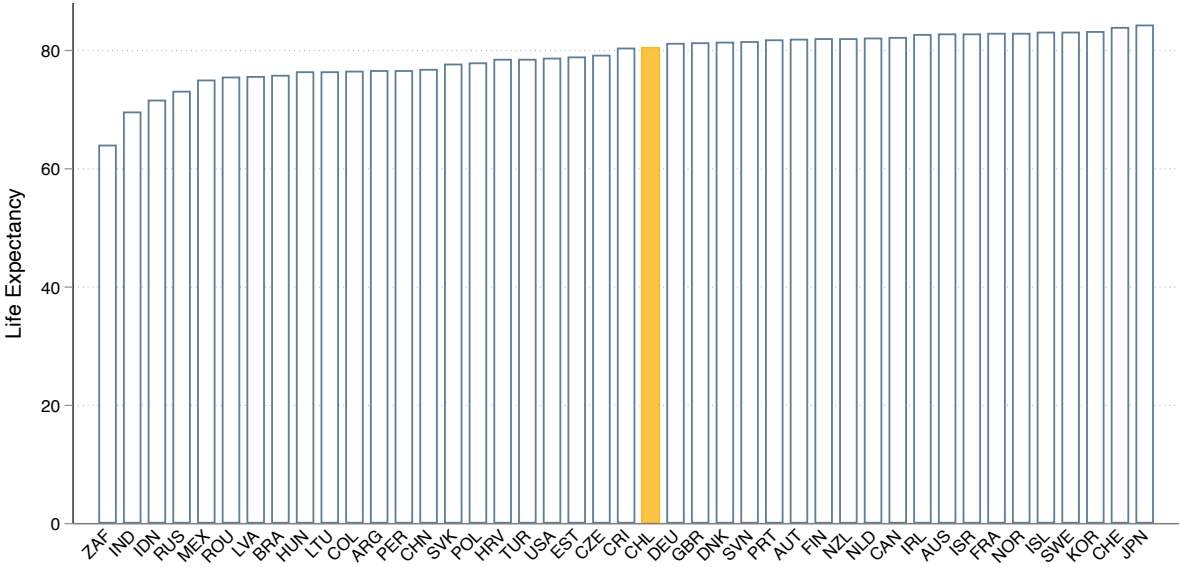
1. Theoretical: market frictions specific to healthcare may misalign for-profit incentives
   (Arrow 1963)
   - e.g., patients may not be able to accurately assess provider quality
   - in a setting with incomplete contracts, private hospitals may be incentivized to reducing costs at the expense of lowering quality on dimensions that are more difficult to monitor
     (Hart, Shleifer and Vishny 1997)

2. Empirical: privatized hospitals are less likely to admit financially unattractive patients
   (e.g., Duggan et al. 2022)

3. Practical: 3/4 medical beds in the developed world are publicly provided.

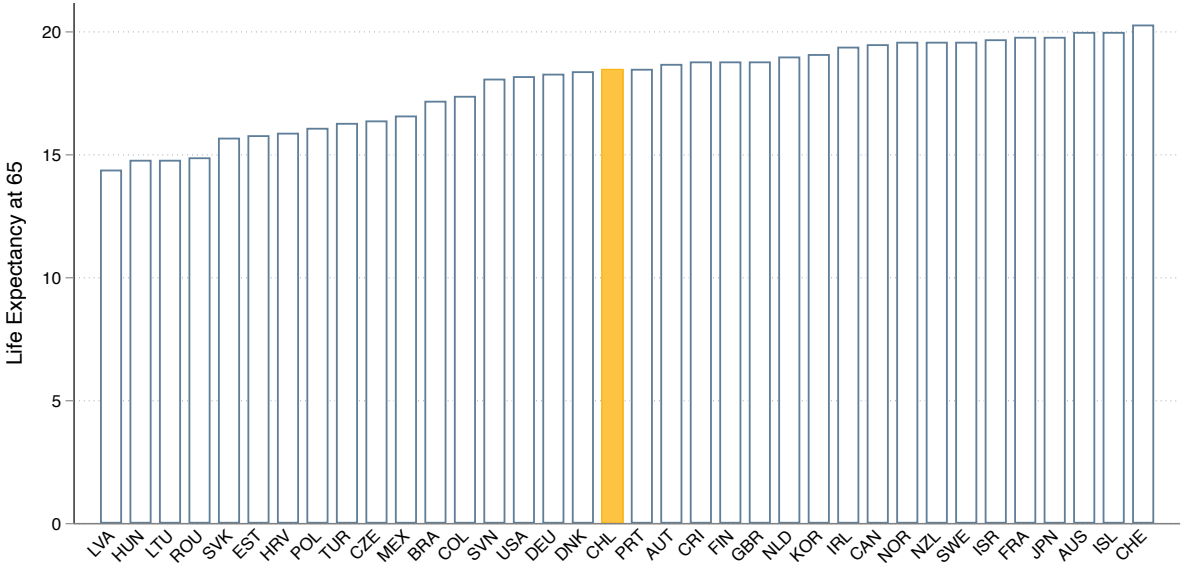
Life expectancy

‣ Back



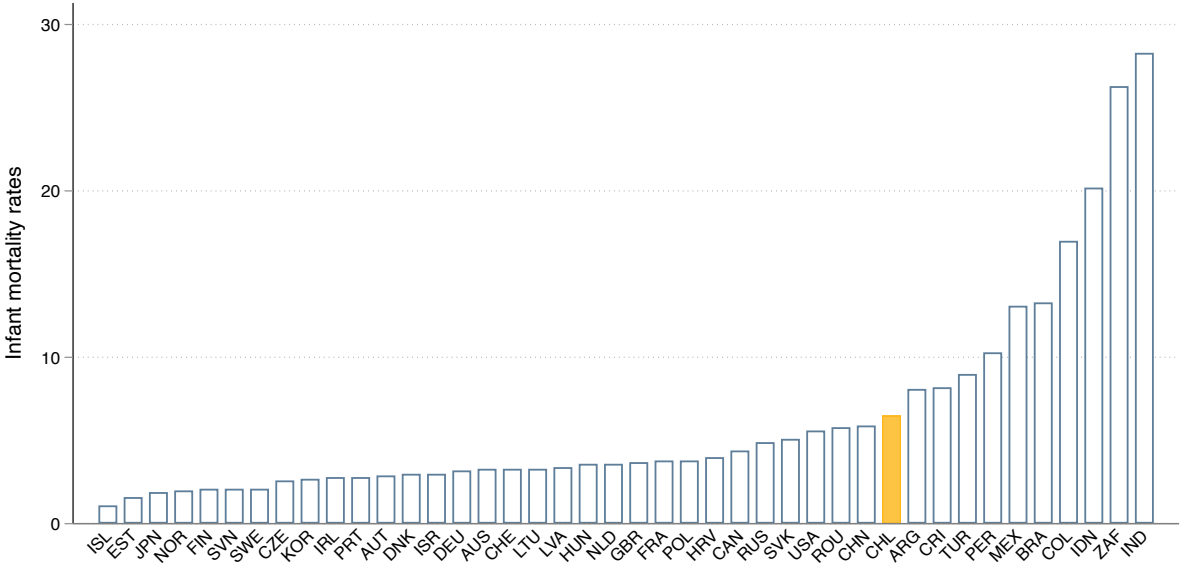
Life expectancy over 65

▸ Back



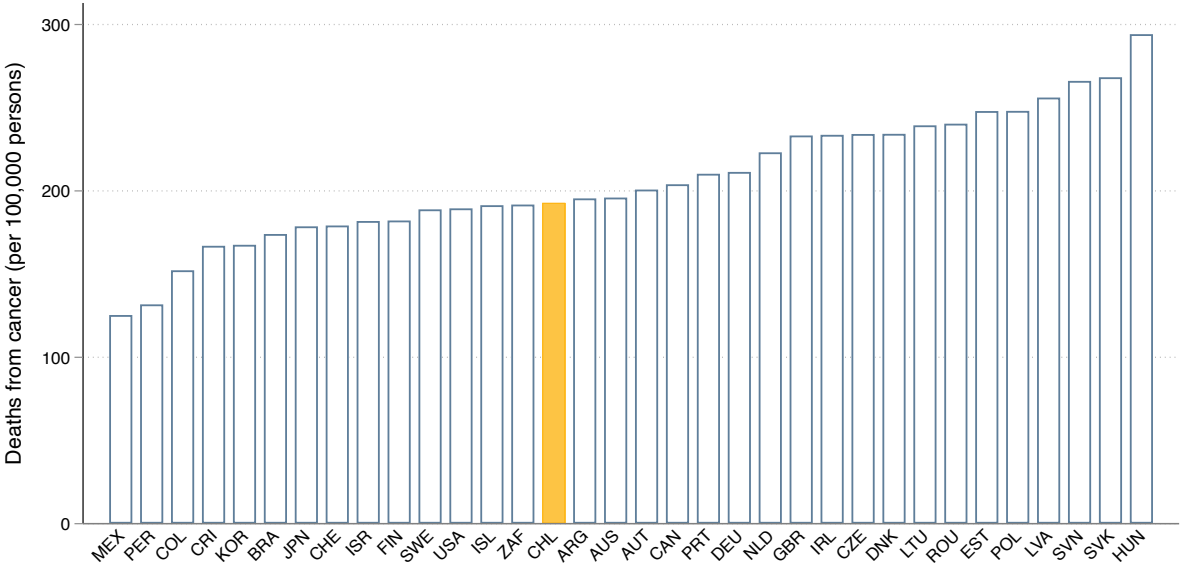
Infant mortality

▸ Back



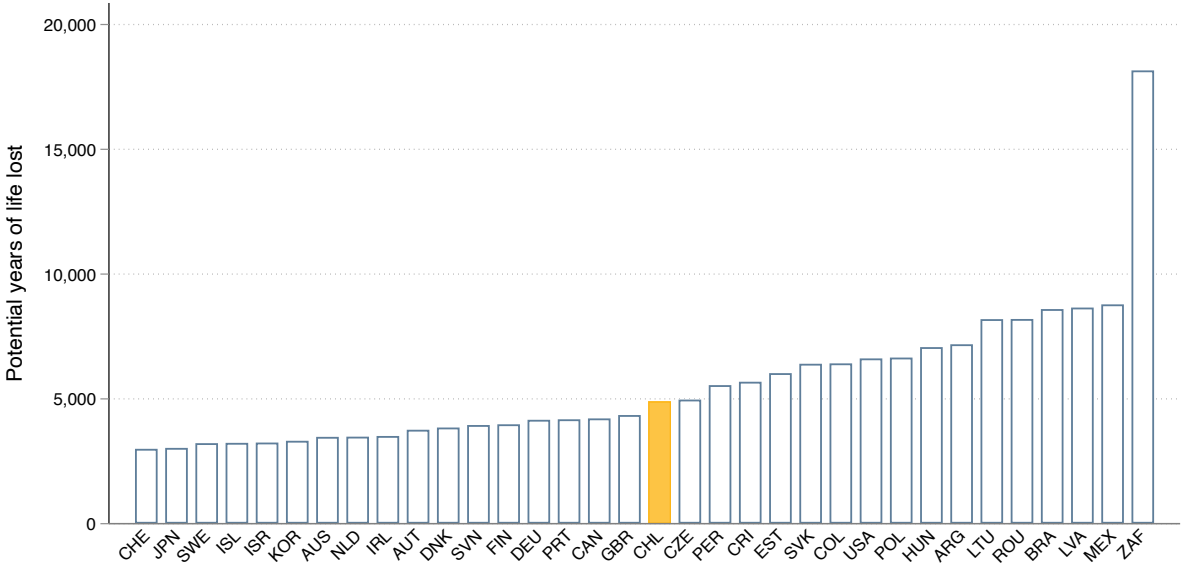
Deaths from cancer

Back



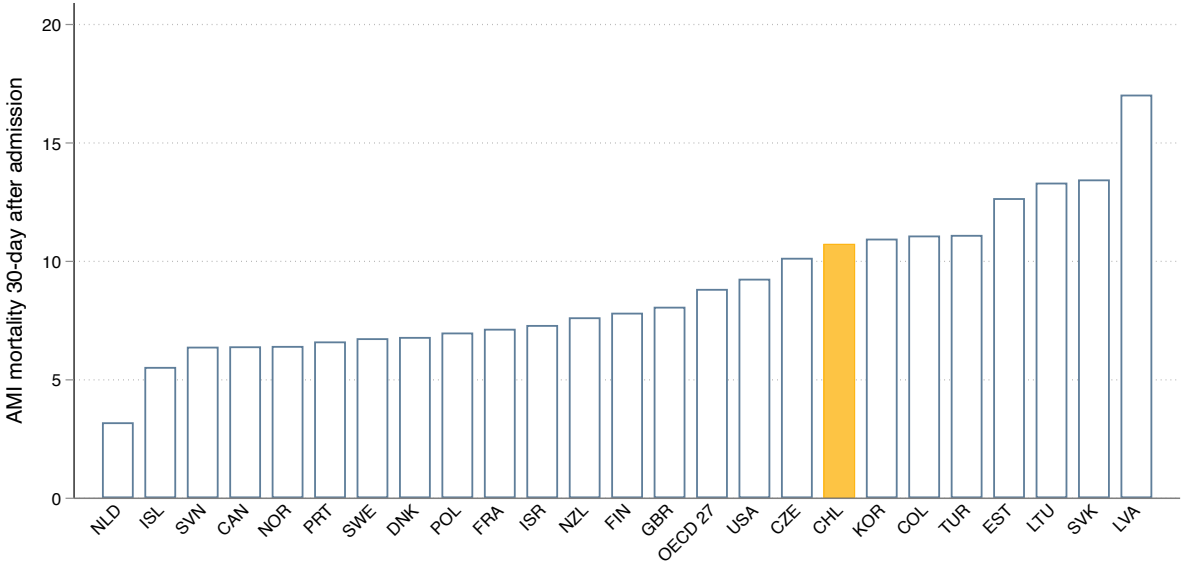
Potential years of life lost

Back

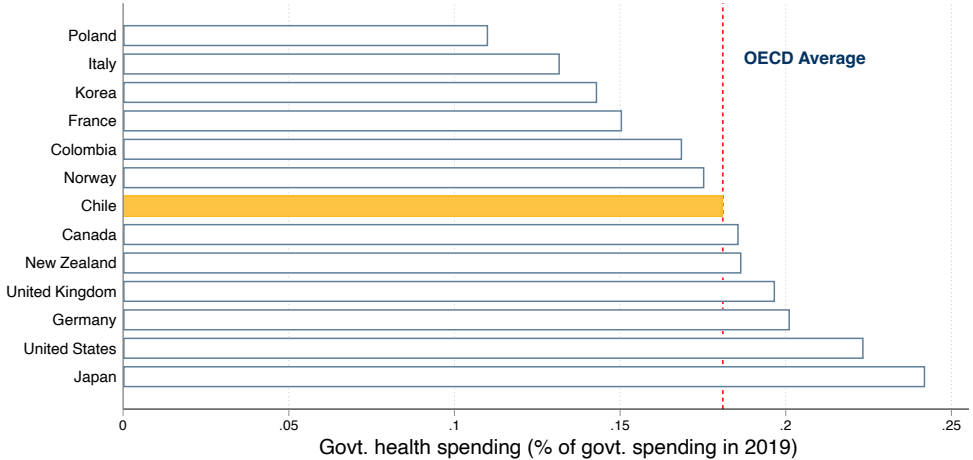


30 day AMI mortality

Back

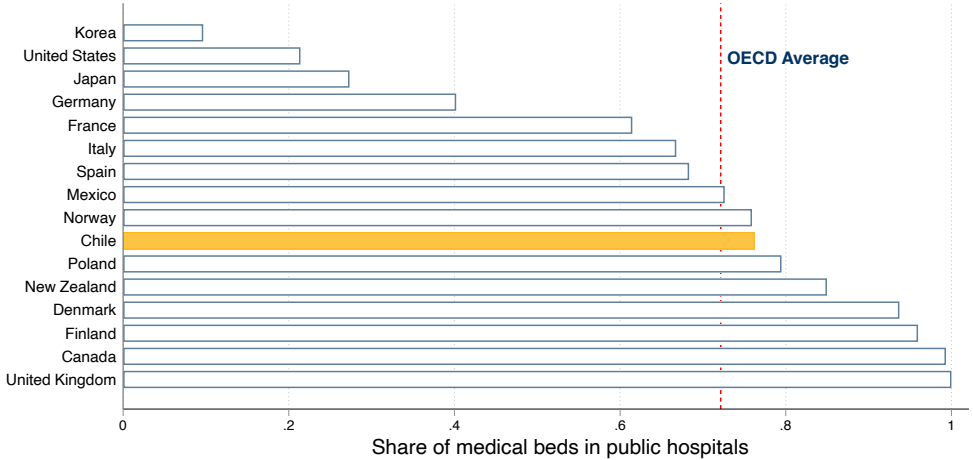


Healthcare government spending is large



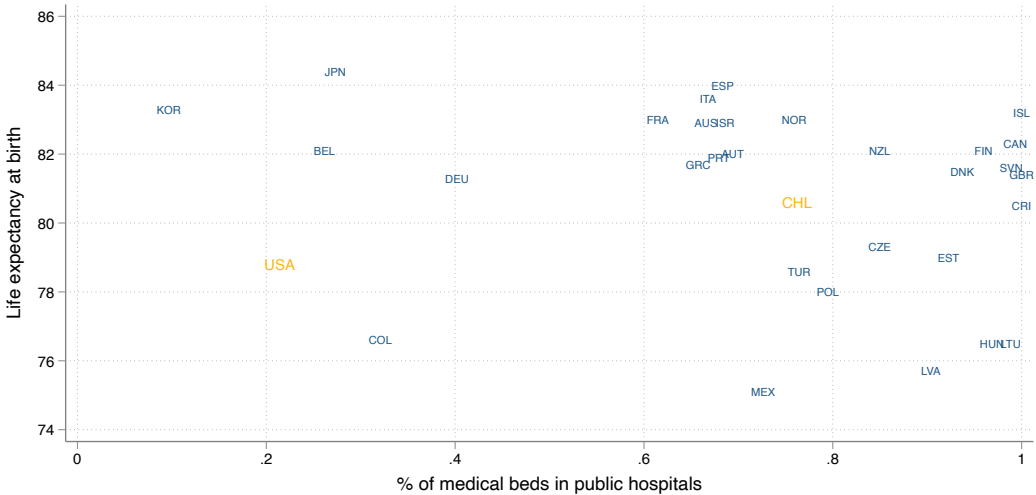
Public hospitals are important for access and equity

Back



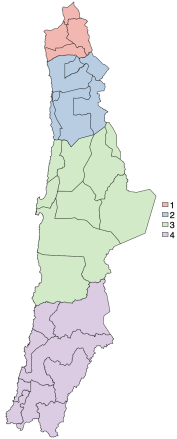
Life expectancy and public sector share

‣ Back

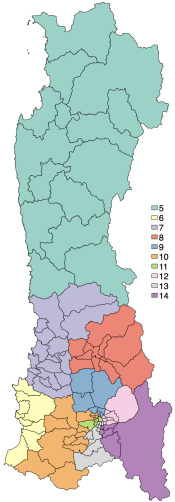


Healthcare provision is organized geographically

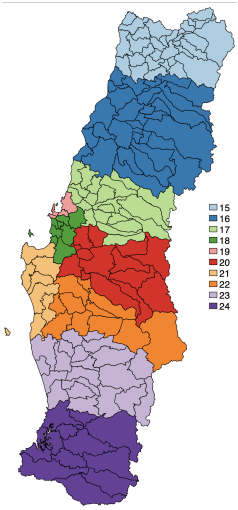
Back



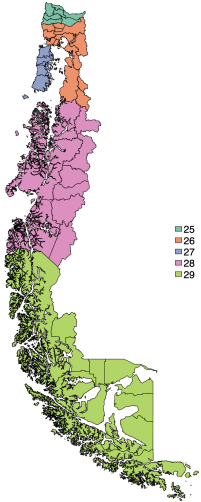
North



North-Center



Center-South



South

Referrals follow strict guidelines

ESTABLECIMIENTOS ATENCIÓN SECUNDARIA Y TERCIARIA				
	1	COMPLEJO HOSPITALARIO SAN JOSÉ	5	UAPO COMUNAL
	2	HOSPITAL CLÍNICO DE NIÑOS ROBERTO DEL RÍO	6	COSAM COMUNAL
	3	INSTITUTO PSIQUIÁTRICO DR. JOSÉ HORWITZ BARAK		
	4	INSTITUTO NACIONAL DEL CÁNCER DR. CAUPOLICÁN PARDO CORREA		

SERVICIO DE SALUD															
COMUNA	Colina									Conchalí					
ESTABLECIMIENTO	109310 - Centro de Saud Familiar Colina	109316 - Centro de Salud Familiar Esmeralda	109416 - Posta Salud Rural Colorado	109417 - Posta Salud Rural Los Ingleses	109418 - Posta Salud Rural Las Canteras	109419 - Posta Salud Rural Santa Marta de Lirey	109420 - Posta Salud Rural Chacabuco	109716 - Centro Comunitario de Salud Familiar Esmeralda	109810 - SAPU Colina		109302 - Centro de Salud Familiar Lucas Sierra	109308 - Centro de Salud Familiar Alberto Bachelet Martínez	109309 - Centro de Salud Familiar José Symon Ojeda	109314 - Centro de Salud Familiar Juanita Aguirre	109709 - Centro Comunitario de Salud Familiar Dr. José Symon Ojeda
PEDIATRÍA															
CARDIOLOGÍA PEDIÁTRICA	2	2	2	2	2	2	2	2			2	2	2	2	2
ENDOCRINOLOGÍA PEDIÁTRICA	2	2	2	2	2	2	2	2			2	2	2	2	2
ENFERMEDADES RESPIRATORIAS PEDIÁTRICAS	2	2	2	2	2	2	2	2			2	2	2	2	2
GASTROENTEROLOGÍA PEDIÁTRICA	2	2	2	2	2	2	2	2			2	2	2	2	2
GINECOLOGÍA PEDIÁTRICA Y DE LA ADOLESCENCIA	2	2	2	2	2	2	2	2			2	2	2	2	2
HEMATOLOGÍA ONCOLÓGICA PEDIÁTRICA	2	2	2	2	2	2	2	2			2	2	2	2	2
HEMOFILIA (SIN LÍMITE DE EDAD)	2	2	2	2	2	2	2	2			2	2	2	2	2
INFECTOLOGÍA PEDIÁTRICA	2	2	2	2	2	2	2	2			2	2	2	2	2
NEFROLOGÍA PEDIÁTRICA	2	2	2	2	2	2	2	2			2	2	2	2	2
NUTRICIÓN CLÍNICA DEL NIÑO Y EL ADOLESCENTE	2	2	2	2	2	2	2	2			2	2	2	2	2
NANEAS	2	2	2	2	2	2	2	2			2	2	2	2	2
MEDICINA INTERNA	1	1	1	1	1	1	1	1			1	1	1	1	1
CARDIOLOGÍA	1	1	1	1	1	1	1	1			1	1	1	1	1
NUTRICIÓN Y DIABETES	1	1	1	1	1	1	1	1			1	1	1	1	1
PROGRAMA MANEJO DE LA OBESIDAD	1	1	1	1	1	1	1	1			1	1	1	1	1
ENDOCRINOLOGÍA ADULTO	1	1	1	1	1	1	1	1			1	1	1	1	1
ENFERMEDADES RESPIRATORIAS ADULTO	1	1	1	1	1	1	1	1			1	1	1	1	1
GASTROENTEROLOGÍA ADULTO	1	1	1	1	1	1	1	1			1	1	1	1	1
HEMATOLOGÍA	1	1	1	1	1	1	1	1			1	1	1	1	1
VIH															
< 15 AÑOS	2	2	2	2	2	2	2	2			2	2	2	2	2
> 15 AÑOS	1	1	1	1	1	1	1	1			1	1	1	1	1
NEFROLOGÍA ADULTO	1	1	1	1	1	1	1	1			1	1	1	1	1
ONCOLOGÍA MÉDICA															
< 15 AÑOS	2	2	2	2	2	2	2	2			2	2	2	2	2
> 15 AÑOS (Derivación desde APS sólo con confirmación diagnóstica realizada)	4	4	4	4	4	4	4	4			4	4	4	4	4
REUMATOLOGÍA															
< 15 AÑOS	2	2	2	2	2	2	2	2			2	2	2	2	2
> 15 AÑOS	1	1	1	1	1	1	1	1			1	1	1	1	1

Referrals follow strict guidelines

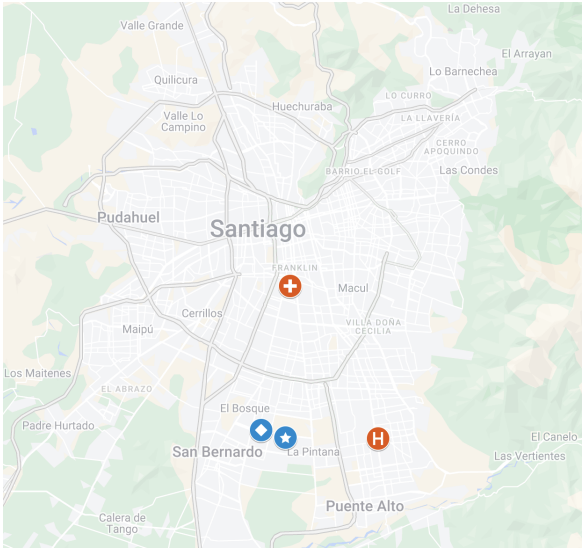
‣ Back

Health Service Name	*Metropolitano Norte*		*Metropolitano Oriente*	
Primary Care	CESFAM Colina (1)	CESFAM Esmeralda (2)	CESFAM Aguilucho (3)	CESFAM La Faena (4)
Pediatrics				
Pediatric respiratory diseases	2	2	4	4
Internal Medicine				
Cardiology	1	1	5	4
Medical Oncology				
$<$ 15 years	2	2	7	7
$>$ 15 years	3	3	5	5
General Surgery				
Thoracic Surgery	3	3	6	6

1. Complejo Hospitalario San José; **2.** Hospital Clínico De Niños Roberto Del Río; **3.** Instituto Nacional Del Cáncer Dr. Caupolicán Pardo Correa; **4.** Centro de Referencia de Salud Cordillera Oriente; **5.** Hospital Del Salvador; **6.** Instituto Nacional del Torax; **7.** Hospital de Niños Dr. Luis Calvo Mackenna.

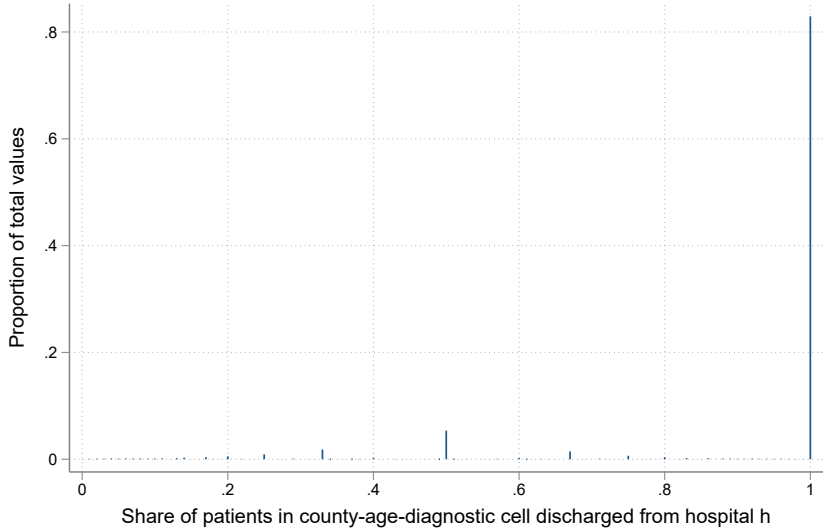
Referrals follow strict guidelines

‣ Back



Strict referrals

▸ Back



Data description

Back

- Employees in the public health sector:
  - FOIA + hand-collected: monthly-level records all public hospitals CEOs and middle manager characteristics and transitions (2001-19)
  - novel and admin. data covering the universe of employees in the public health sector between (2011-19)
- Inpatient discharges $>$ 30 million individual-level admin records of all public hospital discharges (2001-19)
  - include an id, the date and cause of admission, date of discharge or in-hospital death date, type of admission (ER), individual covariates, set of hospital characteristics
- Death records: $>$ 1.5 million individual-level observations covering all deaths in the country (2001-18)
  - include same id as hospital discharges, date of death, cause and place of death

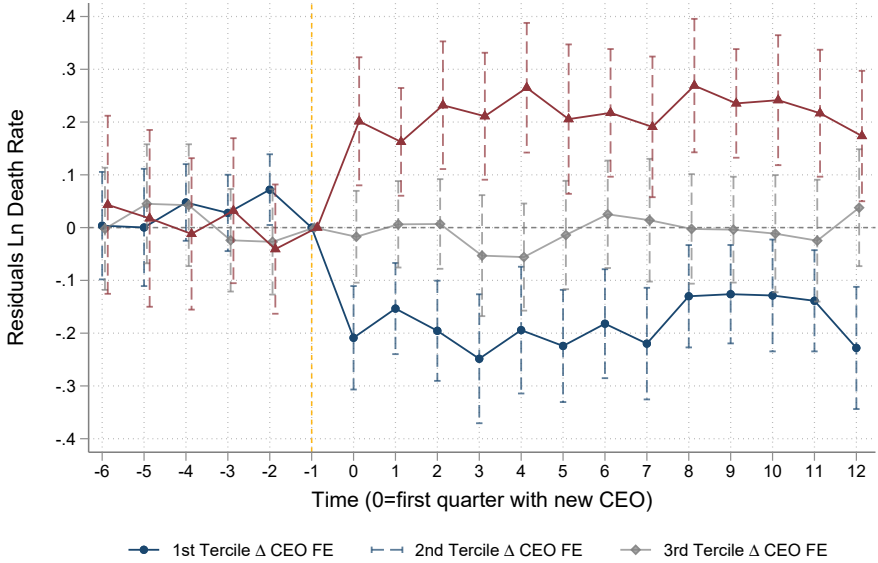
Descriptive statistics

Back

	Mean	Std. Dev.	Bottom 10%	Median	Top 10%	# of Obs.
	(1)	(2)	(3)	(4)	(5)	(6)
Number of deaths	38.21	63.27	1.00	12.00	116.00	13,988
Number of inpatients	1,491	2,006	101	587	4,568	13,988
Death rate	2.46	1.94	0.38	2.15	4.69	13,988
Death rate ER	3.01	3.53	0.15	2.55	5.69	11,087
% Public insurance	0.96	0.05	0.92	0.98	1.00	13,988
% Female	0.59	0.08	0.47	0.60	0.68	13,988
% Age $<$ 29	0.36	0.16	0.14	0.37	0.49	13,988
% Age $\in$ (30,39)	0.12	0.05	0.06	0.12	0.17	13,988
% Age $\in$ (50,59)	0.10	0.04	0.06	0.09	0.14	13,988
% Age $>$ 89	0.02	0.02	0	0.01	0.05	13,988

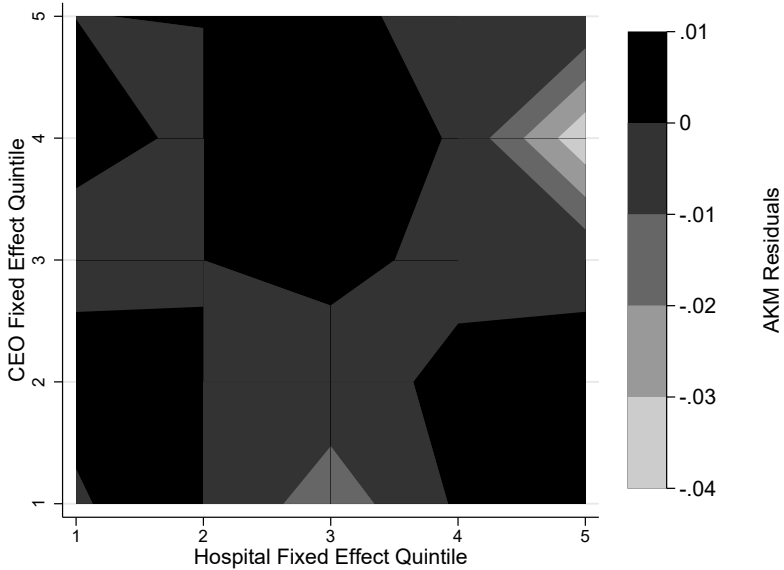
Threats to the identification of managerial talent: Switchers

Back



Mean residual by CEO-hospital quintile

Back



Bias-corrected variances and covariances

‣ Back

- The variance of log death rates can be decomposed as:

Bias-corrected variances and covariances

‣ Back

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$$\begin{aligned}\mathbb{V}(\text{Ln(death rate)}_{ht}) =& \mathbb{V}(\alpha_h) + \mathbb{V}(\psi_{M(h,t)}) + \mathbb{V}(x'_{ht}\beta) + 2\mathbb{C}(\alpha_h, \psi_{M(h,t)}) \\ &+ 2\mathbb{C}(\alpha_h, x'_{ht}\beta) + 2\mathbb{C}(\psi_{M(h,t)}, x'_{ht}\beta) + \mathbb{V}(u_{ht}),\end{aligned}$$

Bias-corrected variances and covariances

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	Component	Share of Total
	(1)	(2)
$\mathbb{V}$(Log Death Rate)	0.526	100%
$\mathbb{V}$(Manager)	0.139	26%
$\mathbb{V}$(Hospital)	0.193	36%
$\mathbb{V}(x'_{ht}\beta)$	0.403	76%
2$\mathbb{C}$(Manager, Hospital)	-0.055	-10%
2$\mathbb{C}(x'_{ht}\beta$, Manager + Hospital)	-0.001	-0.00%
$\mathbb{V}$(Residual)	-0.149	-28%

Correlation between CEO fixed effect and characteristics

‣ Back

	CEO Fixed Effect				
	(1)	(2)	(3)	(4)	(5)
Female	-0.068*	-0.065*	-0.071*	-0.054	-0.052
	(0.037)	(0.036)	(0.036)	(0.035)	(0.035)
Age	0.166***	0.163***	0.163***	0.163***	0.163***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Age^2	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Doctor		-0.084**	-0.166***	-0.101**	-0.115***
		(0.039)	(0.039)	(0.041)	(0.041)
Mgmt. Background			-0.105**	-0.093*	-0.106**
			(0.053)	(0.054)	(0.053)
Doctor $\times$ Mgmt. Studies				-0.199***	-0.199***
				(0.037)	(0.037)
Observations	8,197	8,197	8,197	8,197	8,185
R-squared	0.101	0.102	0.102	0.109	0.110
Sample	All	All	All	All	Degree data available

Financial incentives ‣ Back

(i) Higher base (position-specific) wages in the form of a monthly unconditional bonus
- in our setting represents a 33% increase in the position's pay ‣ Box plot

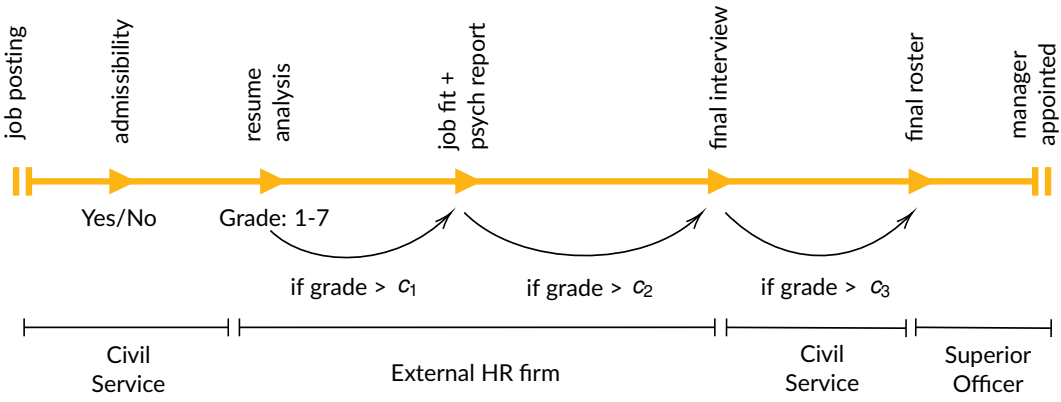
(ii) Performance pay incentives: only trivial penalty based on past performance

$$\text{Yearly Wage}_t = \begin{cases} 100\% & \text{if} \quad \text{performance}_{t-1} \geq 95\% \\ 98.5\% & \text{if} \quad 65\% \leq \text{performance}_{t-1} < 95\% \\ 93\% & \text{if} \quad \text{performance}_{t-1} < 65\% \end{cases}$$

- de facto lax and not binding in our setting (and across the board)

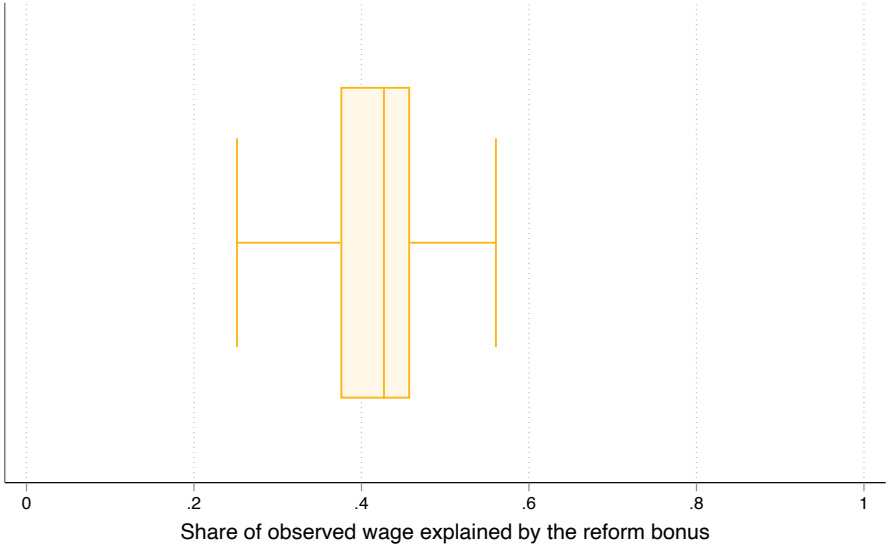
Hiring process in detail

Back



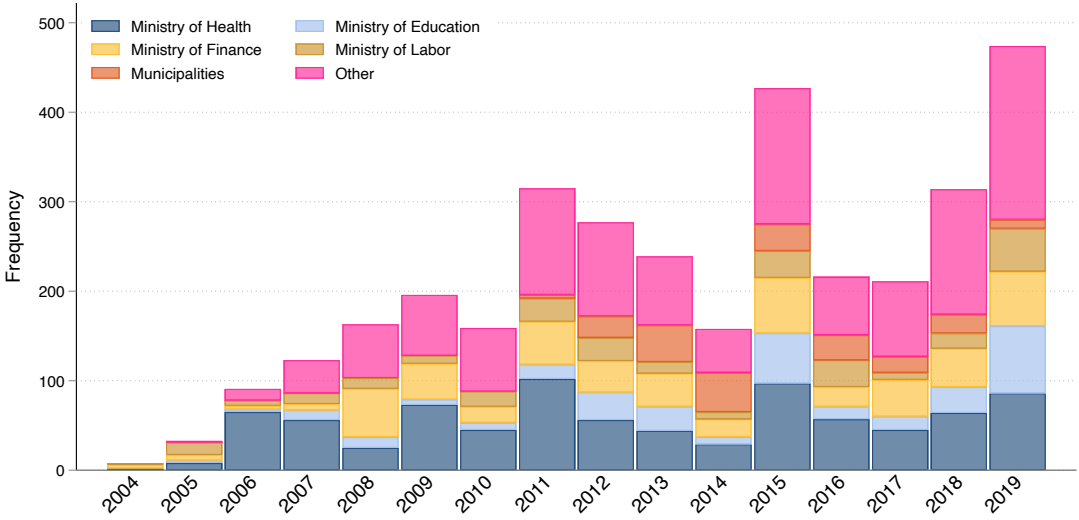
Share of total wage explained by bonus

▸ Back



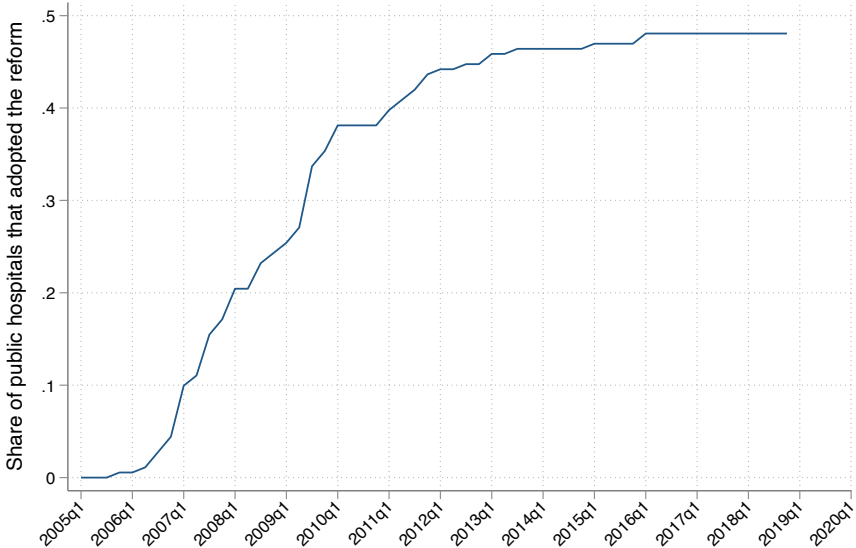
Public agencies gradually adopted selection reform

Back



Public hospitals adopting the reform

Back



Adoption by hospital size

Back

	Never Treated	Ever Treated	Total
Big Hospital	2	61	63
Medium Hospital	6	22	28
Small Hospital	92	5	97
Total	100	88	188

Balance in observables before the reform

Patient composition:	Avg. never adopter (1)	β Ever adopter (Levels) (2)	β Ever adopter (First-Diff) (3)
% Age $<$ 29	0.381	0.042	0.004
		(0.060)	(0.003)
% Age $\in$ (30,49)	0.220	0.005	0.003
		(0.021)	(0.002)
% Age $\in$ (50,69)	0.185	0.009	-0.003
		(0.024)	(0.003)
% Age $\in$ (70,89)	0.197	-0.047**	-0.004*
		(0.021)	(0.002)
% Age $>$ 89	0.018	-0.009***	-0.000
		(0.002)	(0.001)
% Female	0.605	-0.027	0.000
		(0.018)	(0.003)
% Public insurance	0.972	-0.043***	0.003
		(0.009)	(0.002)

Balance in observables before the reform

Hospital outcomes:	Avg. never adopter (1)	β Ever adopter (Levels) (2)	β Ever adopter (First-Diff) (3)
Number of deaths	5.970	47.943***	0.999
		(16.157)	(1.053)
Death rate	1.389	0.497	0.083
		(0.366)	(0.083)
Death rate ER	1.483	1.325**	0.137
		(0.618)	(0.116)
Death rate 28 days	3.305	-0.046	0.155
		(0.504)	(0.143)

Balance in observables before the reform

‣ Back

Political variables:	Avg. never adopter (1)	β Ever adopter (Levels) (2)	β Ever adopter (First-Diff) (3)
% Votes for right	25.764	8.186*	2.674
		(4.792)	(5.691)
% Votes for center	19.107	5.499	2.046
		(5.633)	(3.970)
% Votes for left	24.435	-8.226	-4.579
		(5.256)	(4.275)

Impact on hospital performance: other outcomes

Back

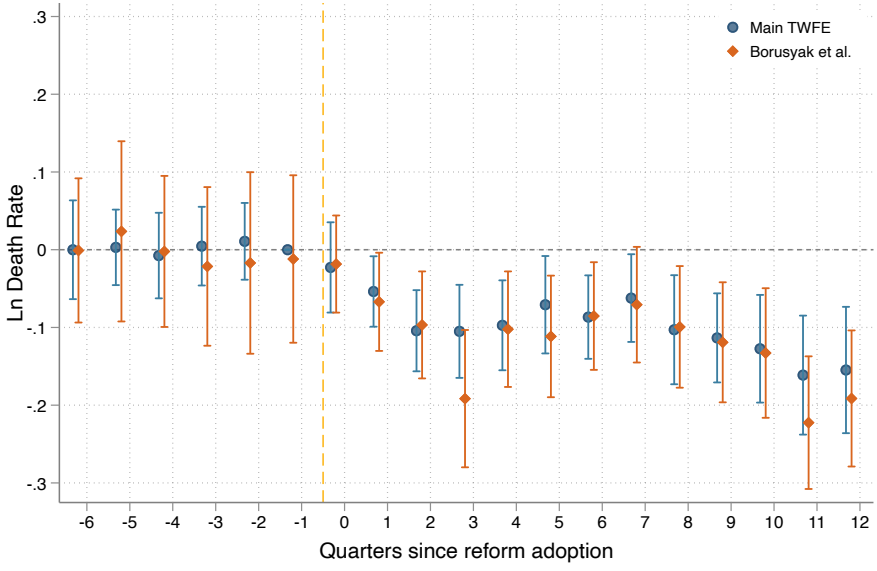
	Ln Death Rate					Readmiss. Rate	
	Stay (main)	Stay ER	28-days	28-days ER	Stay or 28-days	1 month	3 months
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 if reform adopted in hosp.	-0.081***	-0.142***	-0.061*	-0.093**	-0.047***	-0.008	-0.009
	(0.022)	(0.038)	(0.034)	(0.037)	(0.016)	(0.012)	(0.010)
Observations	8,104	6,592	7,335	6,261	8,104	7,893	7,897
R-squared	0.766	0.775	0.720	0.754	0.814	0.808	0.821
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Case-Mix Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Hospitals	181	175	181	176	181	181	181
Mean Dep. Variable	2.625	3.088	4.529	5.209	4.726	21.67	29.43

Robustness checks and other questions ‣ Back

- Other models and estimating procedures
  - treatment effect heterogeneity ‣ Borusyak et al. 2022
  - poisson model ‣ Stay ‣ 30-day
- Are the results too big? ‣ Other policies
- Alternative approaches to study CEO impact on hospital performance
  - examine R^2 after CEO FE inclusion ‣ Evidence
  - two-way fixed effects model and exploit CEO rotation ‣ Evidence

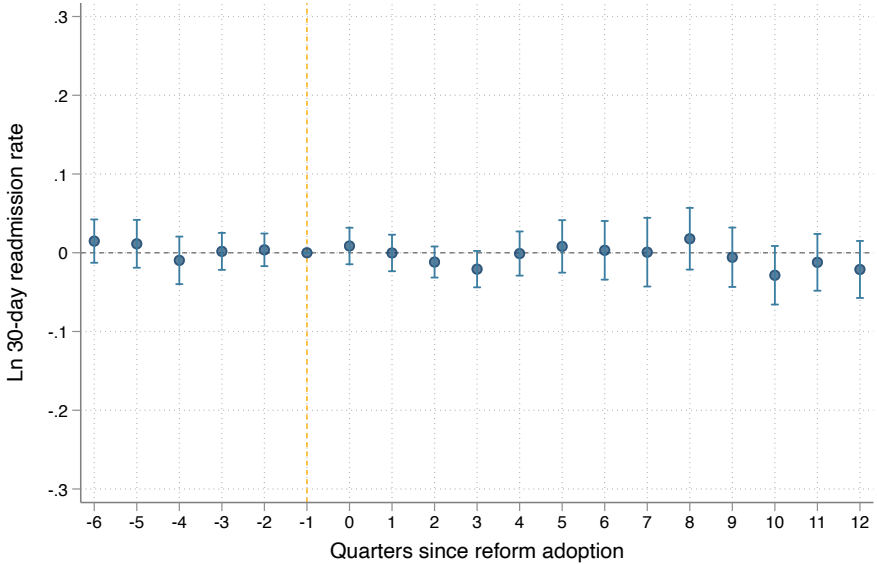
Impact on hospital performance

Back



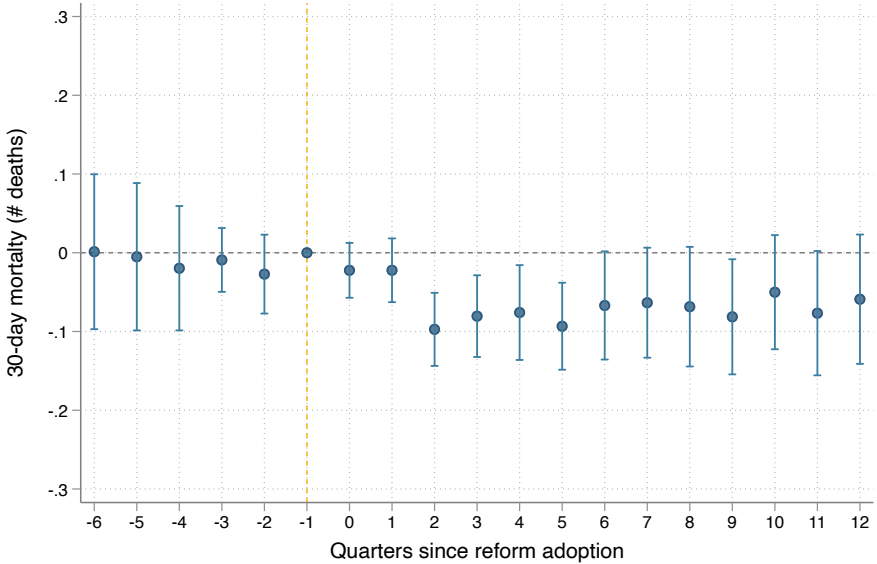
Readmission rate

Back



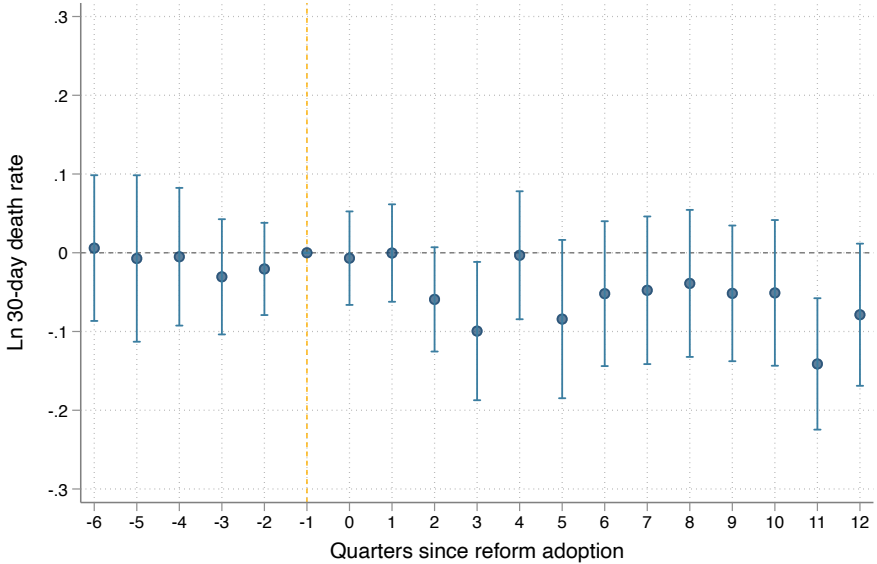
30-day mortality

▸ Back



During stay and following 30-day mortality

Back



Hospital mortality and CEO performance

‣ Back

- To which extent variation in hospital quality can be explained by individual CEOs?
  (Bertrand and Schoar 2003; Fenizia 2022)
  1. regress hospital mortality on explanatory variables
  2. examine change in adjusted R^2 after including CEO fixed effects
  3. test null hypothesis that all the CEO effects are zero

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	Ln Death Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
R^2	.41	.42	.67	.76	.73	.76
Adj. R^2	.40	.41	.66	.73	.69	.72
Observations	6,712	6,712	6,712	6,712	6,712	6,712
Case Mix Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	Yes	Yes
Hospital FE	No	No	Yes	Yes	No	No
CEO FE	No	No	No	Yes	Yes	No
CEO-by-hospital FE	No	No	No	No	No	Yes
F-statistic for CEO FEs	-	-	-	3.4	10.06	-

Two-way fixed effects model: rotation of CEOs

‣ Back

- Exploit the rotation of CEOs across hospitals to study impact on hospital quality
- Consider following model:

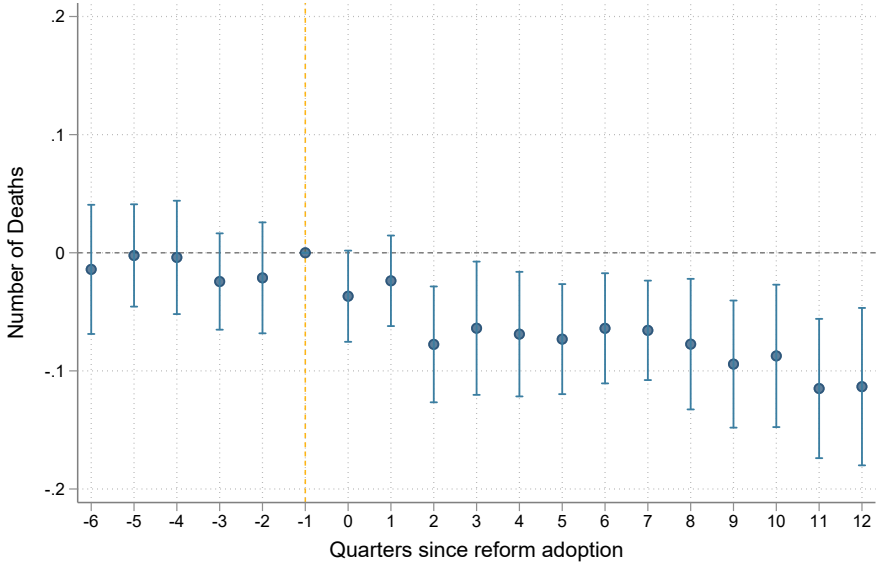
$$\text{Ln(death rate)}_{ht} = \alpha_h + \psi_{M(h,t)} + \gamma_t + X'_{ht}\Delta + u_{ht},$$

  - α_h and $\psi_{M(h,t)}$ are hospital and CEO fixed effects, respectively

- For estimation: condition on connected sets (Abowd et al. 1999; Card et al 2013)
  - # CEOs: 789; # hospitals: 113; # connected sets: 19; # movers: 86
- Threats to identification ‣ Supporting evidence
  1. CEO mobility might be endogenous
  2. potential existence of match effects between CEOs and hospitals
- Bias-corrected variance covariance decomposition (Andrews et al. 2008) ‣ Results
- Correlation between CEO fixed effect and characteristics ‣ Results

New selection process decreased # of deaths

Back



CEO selection reform in context of other policies

‣ Back

Policy	Paper	Death rate definition	Average death rate	Impact on death rate	Sample of patients
(1)	(2)	(3)	(4)	(5)	(6)
Spending					
↑ 10% p/capita	Doyle et al. *JPE* '15	All, 1-year	37%	↓ 6%	ER + Amb. + ≥ 65*
	Ours		32%	↓ 7%	ER + ≥ 65
Public vs Private					
VA v. Non-VA hospitals	Card & Chan '22	All, 1-year	29%	↓ 7%	ER + Amb.+ ≥ 65
	Ours		32%	↓ 7%	ER + ≥ 65
Competition					
+1 hospital in neighborhood	Bloom et al. *ReStud* '15	In-hospital, 28-day	15%	↓ 10%	ER + AMI
↓ 10% HHI	Gaynor et al. *AEJ EP* '13	In-hospital, 28-day	1.6%	↓ 1%	All patients
	Ours		2.3%	↓ 15%	All patients

Notes: HHI: Herfindahl–Hirschman index; AMI: Acute Heart Infarction; Amb: arriving by ambulance; *: non-deferrable medical conditions.

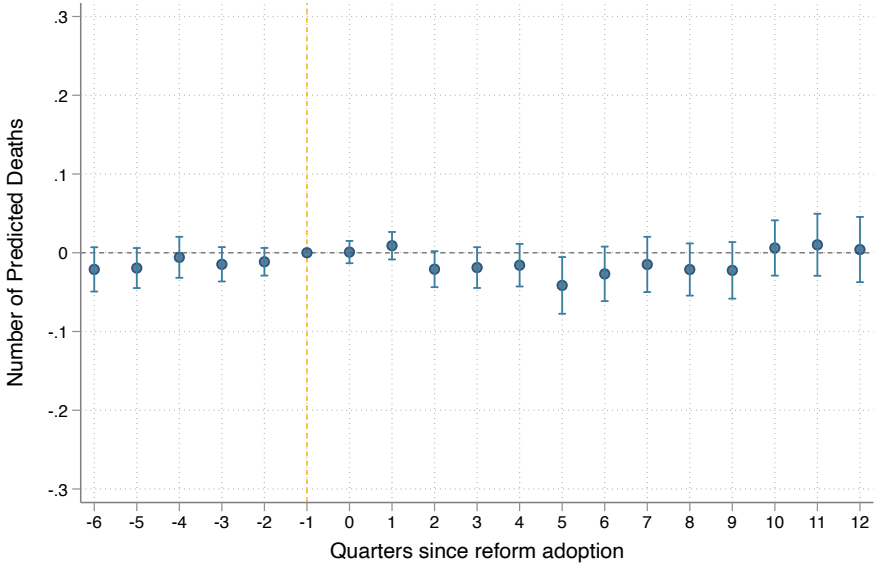
Risk adjustment procedure

▸ Back

- Similar to Centers for Medicare & Medicaid Services (CMS) procedure
- CMS risk-adjusted mortality is a reliable and valid indicator of hosp. quality in the US (Chandra et al. 2016; Doyle et al. 2019)
  - institutional setting in the US is prone for patient selection
- Procedure:
  1. Fit a logit of death at the patient level on a set patient charac. in the pre-period
  2. Predict death likelihood at the patient level
  3. Compute the average predicted number of deaths at the hospital level, $\bar{y}_{ht}$

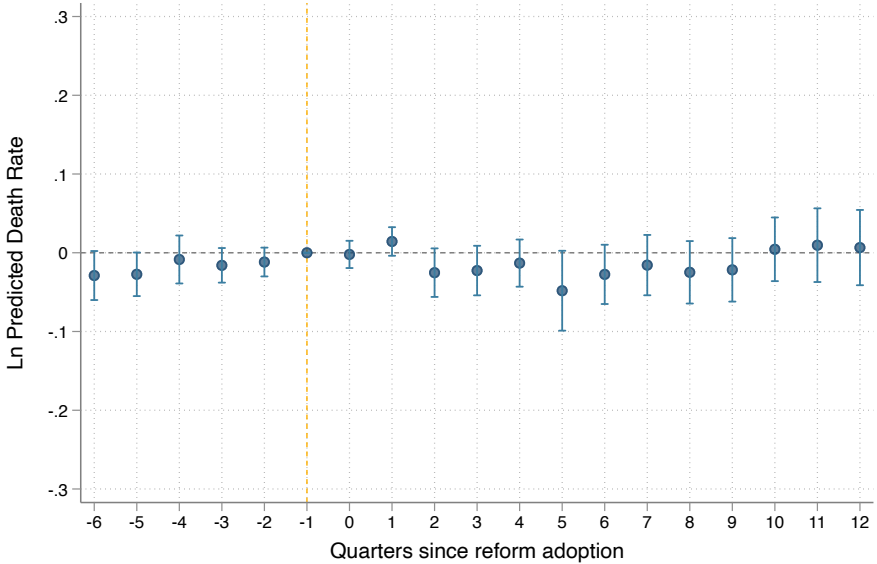
Predicted death count: past diagnosis

Back



Predicted death rate

Back



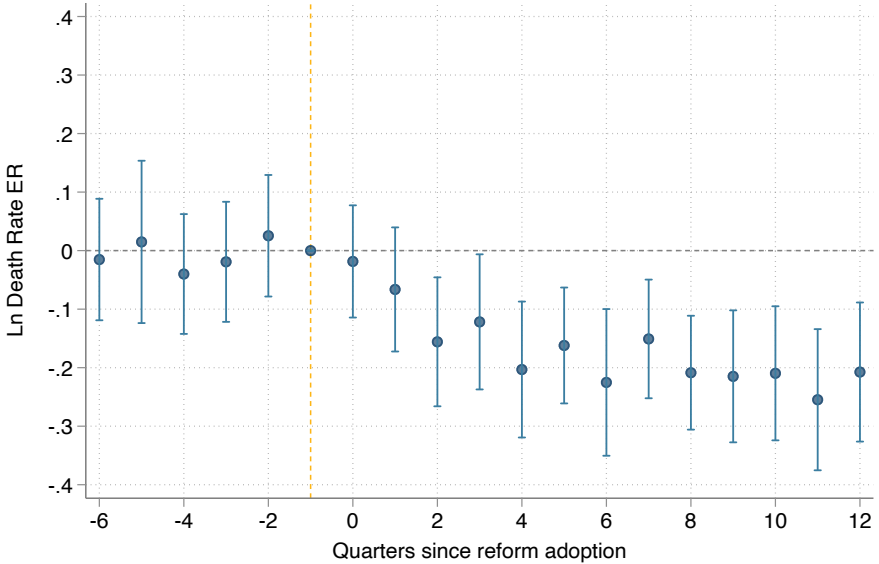
Results are not explained by a change in patient composition

Back

	Death Rate			
	Ln Predicted	Ln Actual/Predicted		
	(1)	(2)	(3)	
1 if reform adopted in hospital	-0.004	-0.086***	-0.090***	-0.089***
	(0.004)	(0.023)	(0.024)	(0.024)
Observations	8,104	8,104	8,104	8,104
Time FE	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes
Patient Demographics	Yes	Yes	Yes	Yes
Type of Insurance	Yes	No	Yes	No
Enhanced Elixhauser Comorbidity Index	Yes	No	No	Yes
Pseudo-R^2 Logit		0.147	0.158	0.176
# of Hospitals	181	181	181	181
Mean Dep. Variable	3.506	0.780	0.712	0.737

Results are robust in specifications for ER patients

Back



Mgmt. experience of CEOs appointed post reform

Back

	Mean	Std. Dev.	Obs.
Previous experience			
in same hospital	.33	.47	648
in public sector	.93	.25	648
in health sector	1	.07	648
in management	.99	.12	648
as CEO	.45	.5	648
as CEO in private hospital	.07	.25	648

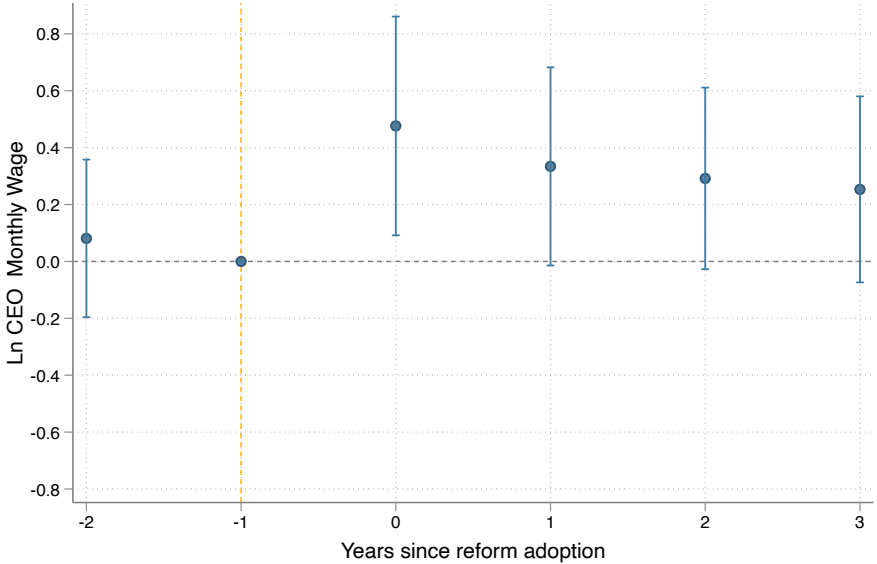
CEO management training and hospital performance

Back

	Ln Death Rate (%)	
	(1)	(2)
Reform	-0.116***	
	(0.028)	
Reform & Internal		0.013
		(0.070)
Reform & External		-0.127***
		(0.029)
Observations	7,711	7,711
Time FE	Yes	Yes
Hospital FE	Yes	Yes
Case mix	Yes	Yes
Mean Dep. Variable	2.62	2.62
p value *Internal = External*		0.057

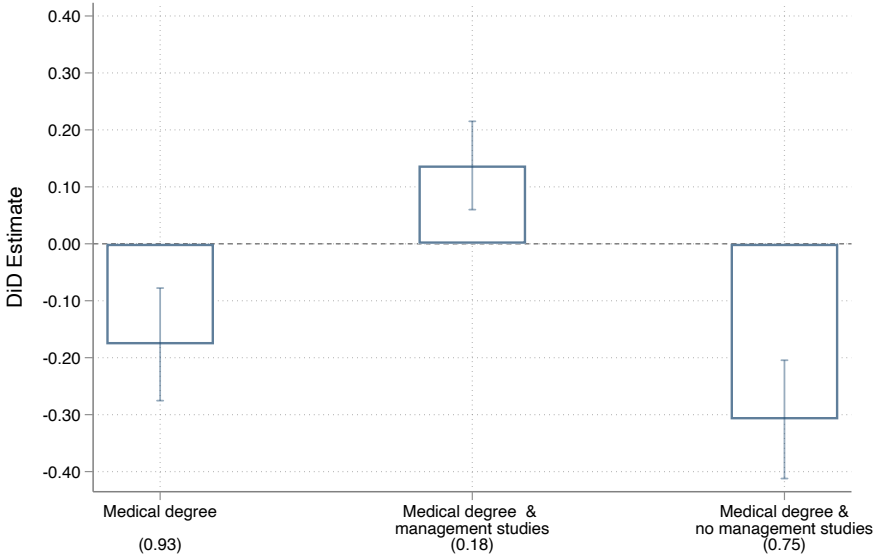
Wage effects

Back



Reform only displaced doctor CEOs w/o mgmt. training

▸ Back



Reform incentivized doctors to study management

Back

Some Chilean universities offer an MBA in Health, so that their graduates can work in administrative positions such as managers or directors of hospitals and even Seremis.

One of the institutions that offers this MBA with a specialization in Health is the Andrés Bello University (Unab), which allows students to acquire and deepen subjects such as economics, administration, marketing, epidemiology applied to management and clinical management.

Unab has carried out 21 versions of this program since 2005, and its success is based on its implementation in several cities in the country, from Iquique to Punta Arenas, in hotels and hospitals, with more than 500 graduates, reported the newspaper La Tercera.

There is also a Senior Management version, aimed at professionals with more experience and who intend to achieve or remain in senior management positions. The difference of this program is that it has a double degree with the Iede-UEM Business School of Spain, even one of the three semesters that the MBA lasts is taught entirely by Spanish professors, and it is necessary that the students carry out an internship in Europe.

Universidad Mayor has the MBA in Health Management and Management, a one-and-a-half year program with a more strategic focus, focused on problem solving, development of entrepreneurship for new business ideas. The 18-month master's degree has three lines of development: strategic analysis, business management and strategic direction.

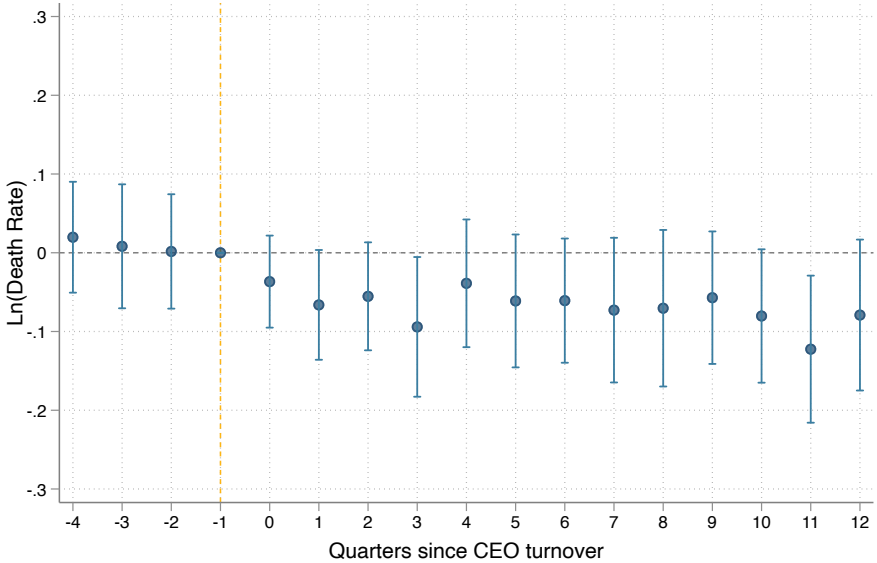
CEO transitions according to management studies

Back

	Current CEO has:			
Previous CEO had:	Non-Mgmt. Studies (1)	Mgmt. Studies (2)	No Data (3)	*Total*
Non-Mgmt. Studies	431	94	5	530
Mgmt. Studies	95	66	4	165
No Data	31	4	4	39
Total	557	164	13	734

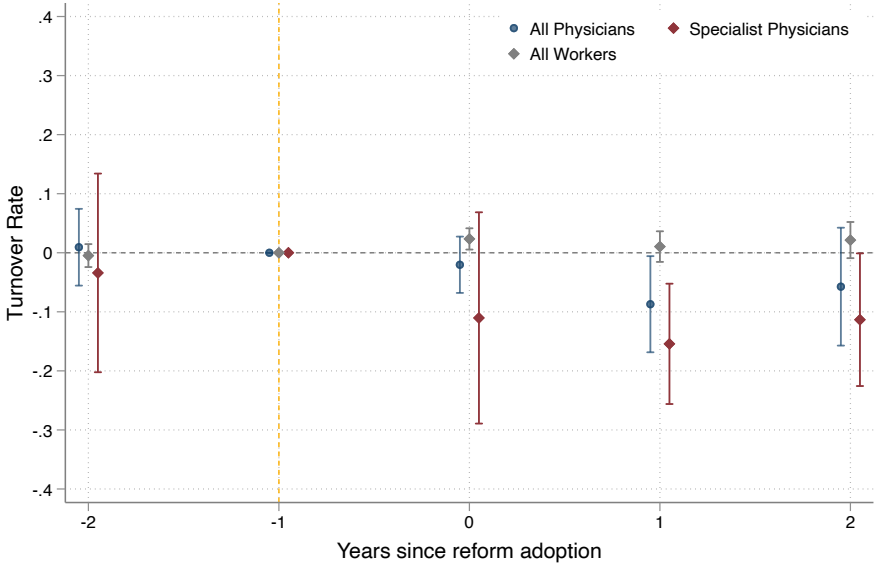
No pre trends in CEO transition

Back



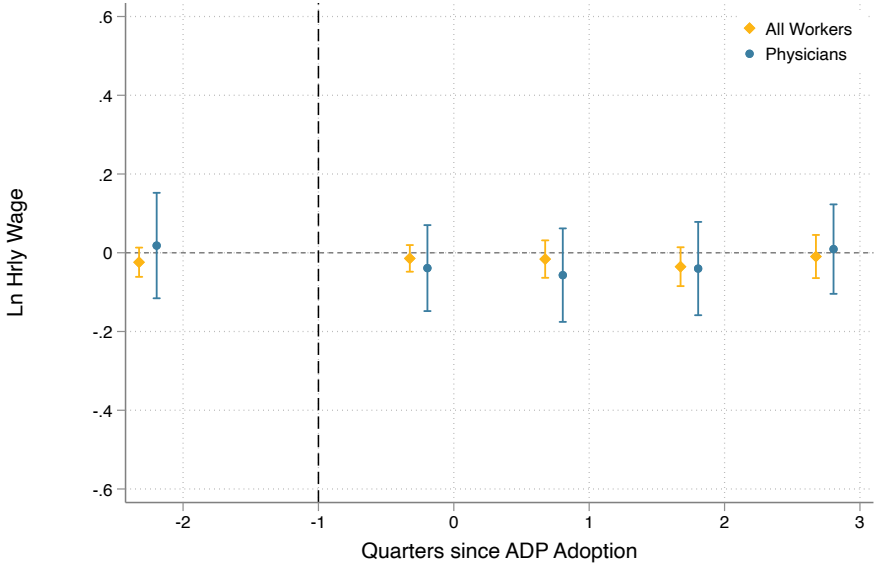
Reduced high-skilled worker turnover

Back



No effect on hourly wages

Back



Are new CEOs exerting more effort due to higher wages

- Reform simultaneously changed recruitment & increased wages

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    + control group: units with no transitions

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  - select valid events *e* (26/35): balanced & no transitions 2 periods before event

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  - for each event:
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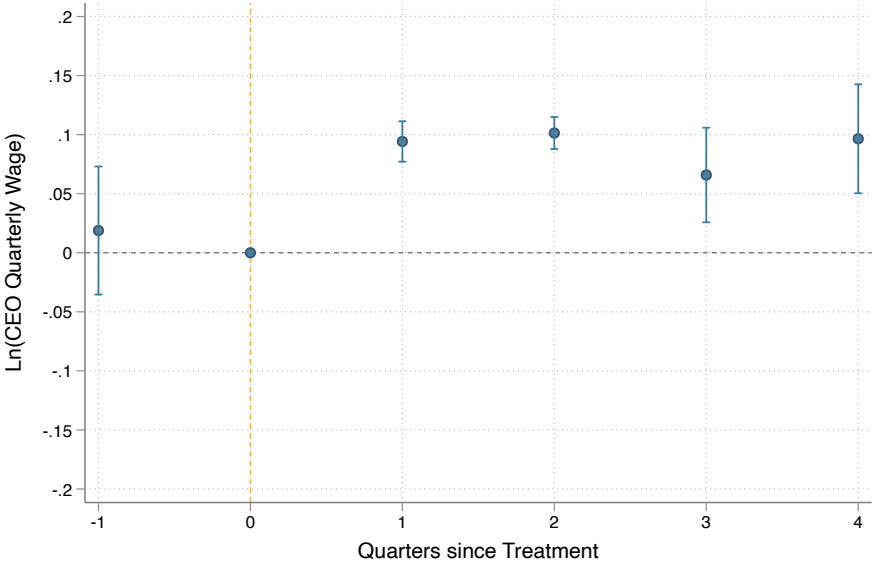
    - control group: units with no transitions
  - select valid events e (26/35): balanced & no transitions 2 periods before event
  - append data for all valid events and estimate:

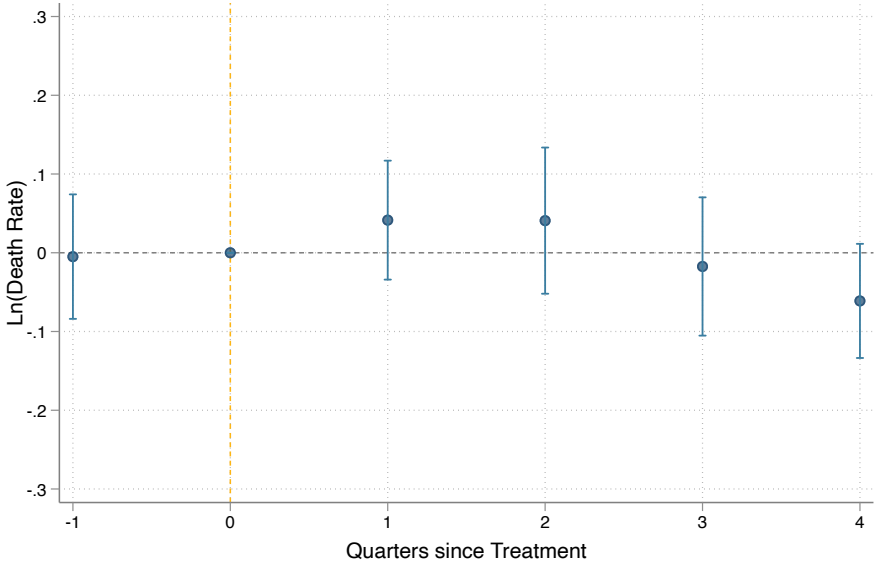
$$y_{hte} = \alpha_{he} + \gamma_{te} + \sum_{k=-1}^{4} \beta_k D_{hte}^k + \epsilon_{hte}$$

Amendment to the reform effect on wages



CEO performance doesn't improve with higher wages

Back



Performance pay incentives in the reform

- Senior executives agree to a 3-year performance contract
  - get a performance score based on the parameters in the contract

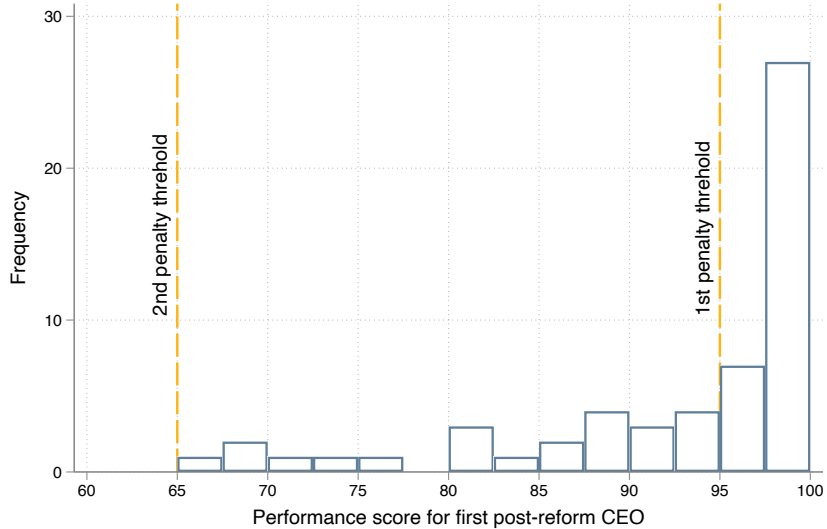
- Performance score impacts compensation according to:

$$\text{Yearly Wage}_t = \begin{cases} 100\% & \text{if} \quad \text{performance}_{t-1} \geq 95\% \\ 98.5\% & \text{if} \quad 65\% \leq \text{performance}_{t-1} < 95\% \\ 93\% & \text{if} \quad \text{performance}_{t-1} < 65\%. \end{cases}$$

  - performance incentives trivial part of wage and apply only after second year

Performance pay was not binding

‣ Back ‣ Regression results



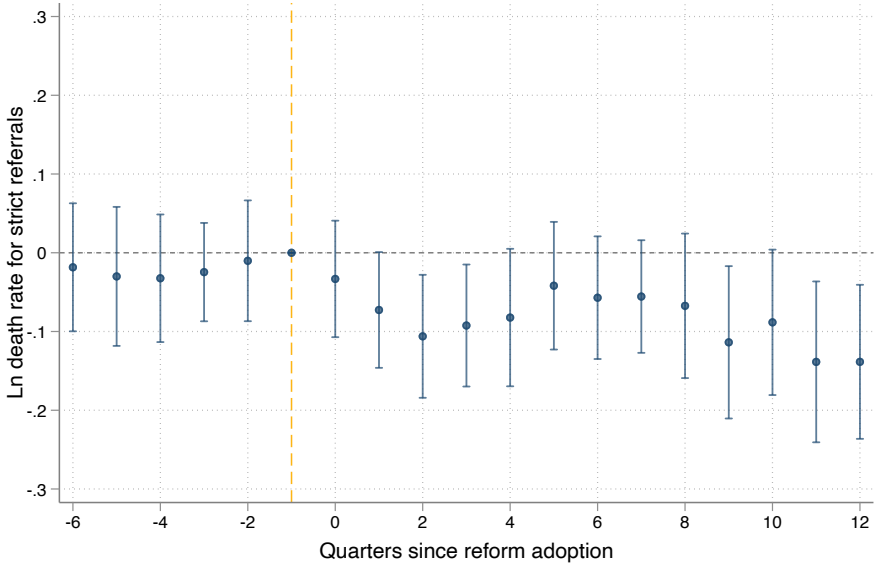
No differential impact in performance pay scores

Back

	Ln Death (%) (1)	Ln Death (%) (2)
Reform	-0.087***	
	(0.028)	
Reform & High Score		-0.086**
		(0.033)
Reform & Low Score		-0.089**
		(0.036)
Observations	7,670	7,670
Time FE	Yes	Yes
Hospital FE	Yes	Yes
Case Mix Controls	Yes	Yes
# of Hospitals	181	181
Mean Dep. Variable	2.61	2.61
p-value *High Score = Low Score*		0.94

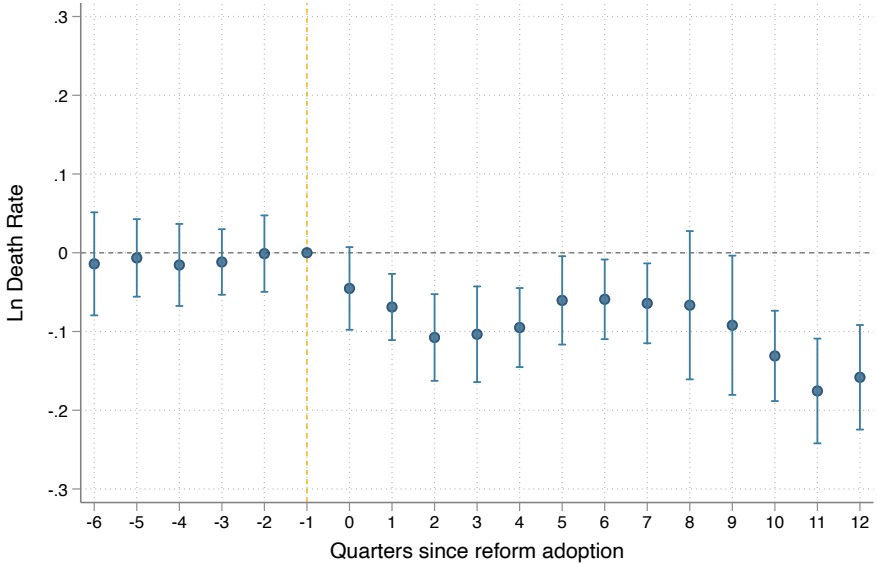
No evidence of unobserved patient sorting: strict referrals

Back



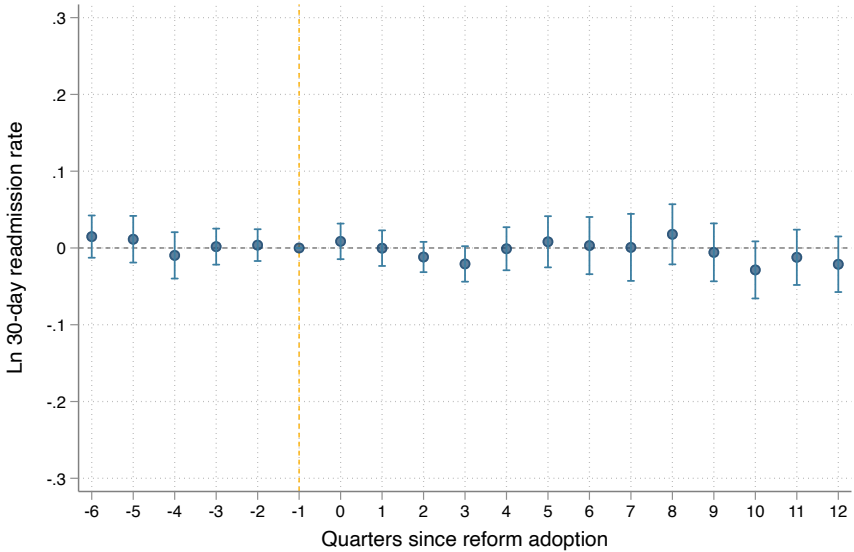
Impacts on hospital performance: stacked event study

Back



Impact on hospital performance: readmission rates

Back



Correlation w/ other performance metrics: waiting lists (prelim.)

Back

	(1) Ln surgical waitlist	(2) Ln medical waitlist	(3) Ln both waitlist
1 if reform adopted in hospital	0.319	0.816	0.601
	(0.412)	(0.689)	(0.445)
Observations	56	412	464
R-squared	0.687	0.827	0.853
Time FE	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes
# of Hospitals	14	89	96
Mean Dep. Variable	870	2,287	2,313
Data Period	$\geq$ 2012	$\geq$ 2012	$\geq$ 2012