

# Assessing The Impact of CMS' Hospital Price Transparency Regulations

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THE UNIVERSITY  
*of* NORTH CAROLINA  
*at* CHAPEL HILL

# Roadmap

1 Institutional Background and Motivation

2 Data and Reduced Form Work

3 Structural Model

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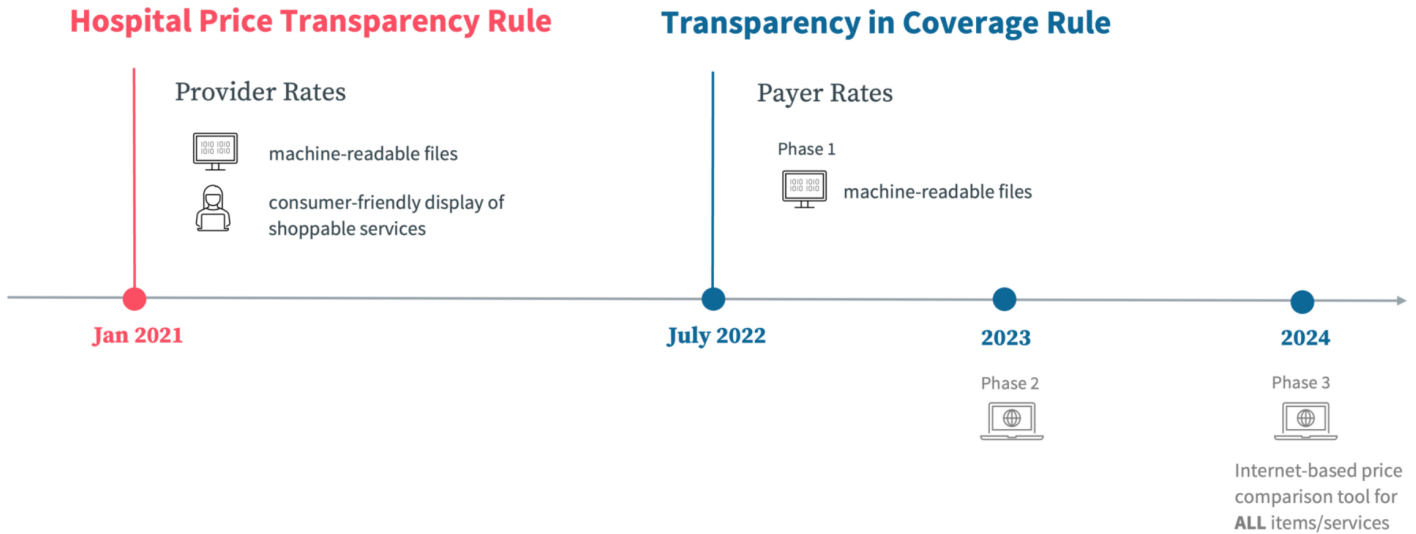
# Transparency has been at the forefront of recent health care policy debate

- ▶ Information frictions are a prominent feature of health care markets in the United States
  - ▶ Notably, **prices** may not be known when patients make decisions
- ▶ Despite recent efforts, price transparency remains a salient issue
- ▶ Policymakers attempt to set policy to promote:
  - 1 Price shopping to reign in growing healthcare spending
  - 2 Protect patients
  - 3 Promote competition in provider-insurer price negotiations

# CMS Hospital Price Transparency Rules

- ▶ **Focus of this paper:** CMS' 2019 Hospital Price Transparency Final Rule
- ▶ Mandate for all hospitals in the U.S. to provide publicly accessible standard charge information online in two ways:
  - 1 A comprehensive machine-readable file with all items and services available at the facility
  - 2 A summary of 300 “shoppable services” that a consumer could schedule in advance in a consumer-friendly format
- ▶ Efficacy of the rule is determined by the degree of hospital adherence and consumer adoption

## CMS has required healthcare pricing to be public



# Have hospitals adhered to the regulation?

- ▶ Wide range in compliance figures:
  - ▶ *Patient Rights Advocates* found only 36% full compliance
  - ▶ CMS and other studies found  $\sim 2/3$  compliance
- ▶ Low compliance has been attributed to the complexity and abruptness of the regulation, also to the nominal financial penalties
- ▶ In 2022, CMS increased the maximum civil monetary penalty for non-compliance from \$100,000/hospital to more than \$2M/hospital
- ▶ CMS has issued over 700 warning notices and 250 CAP requests
- ▶ To date, fourteen hospitals have been penalized (fines ranging from \$56,940 - \$979,000)



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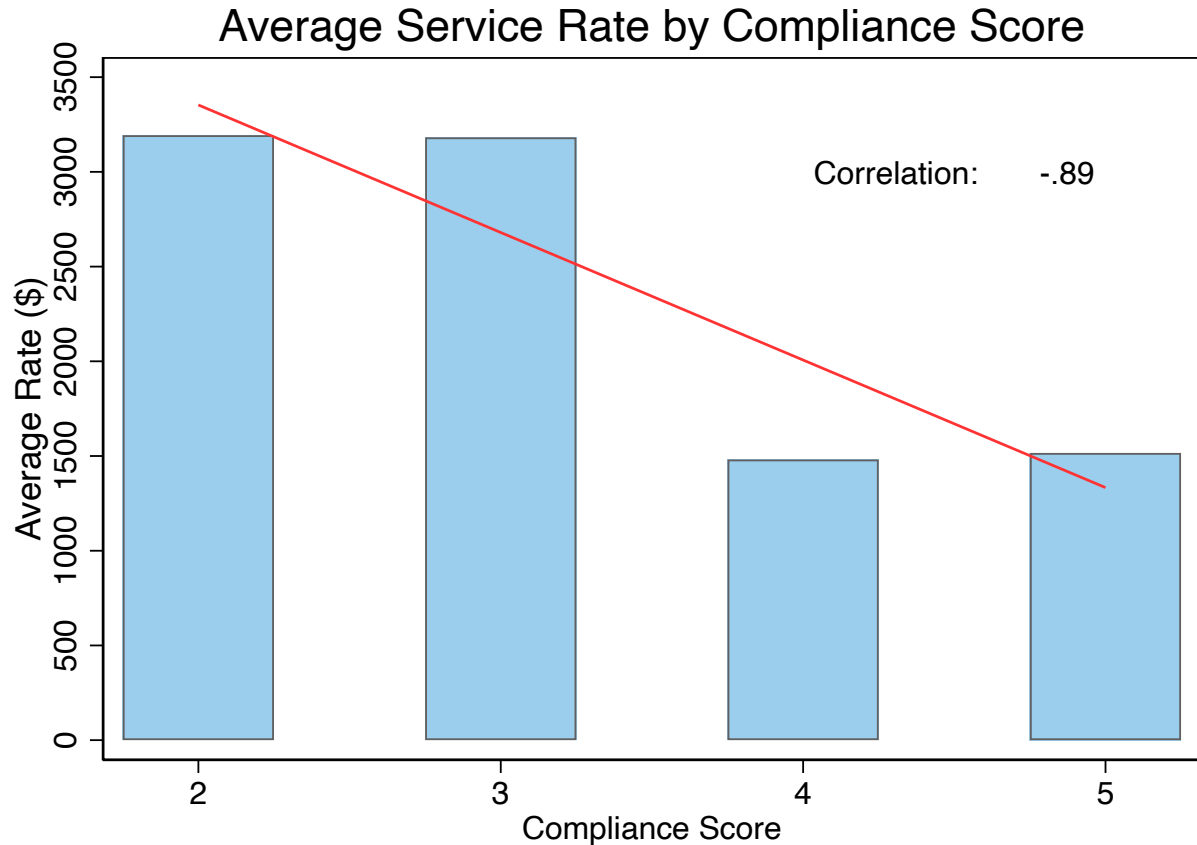
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- 4 Mixed evidence of consumer search after the rollout of price transparency tools (Gourevitch et al, 2021; Bernstein, 2016)

# More evidence that hospitals *may* be acting strategically



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## Data

- 1 Blue Cross Blue Shield of North Carolina (BCBSNC) claims data from 2018-2023:
  - ▶ Detailed information on demographics, visits, and billing for approx. 2.6 million member months covered by BCBSNC.
  - ▶ Includes fully-insured, ASO, and ACA exchange plan members.
  - ▶ Importantly allows me to identify providers by name and location.
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- 3 *ComScore Web Behavior Panel (TBD)*

# Begin with basic event study regressions

Beginning with the set of 70 shoppable services for which CMS requires hospitals to post prices:

$$y_{hit} = \beta_0 + \beta_1(t - Y_r) + \beta_2 C_{ht} + (\beta_3(t - Y_r) \times C_{ht}) + X_{hit}\beta_4 + \epsilon_{hit} \quad (1)$$

- ▶  $\beta_2$  captures any discrete change at the time rule went into effect,
- ▶  $\beta_3$  captures the change over time as the rule is implemented.

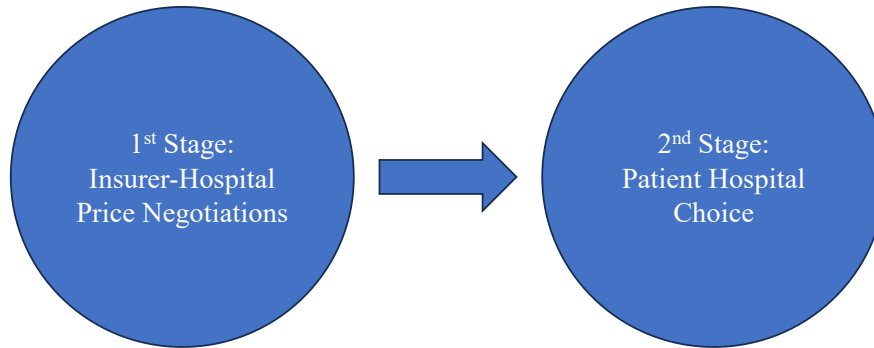
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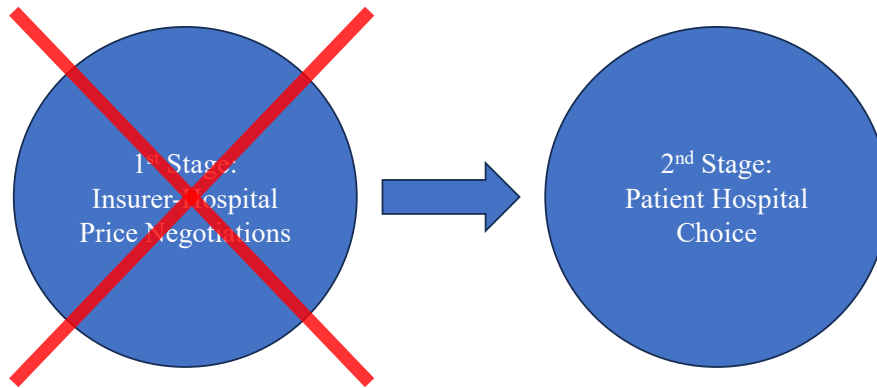
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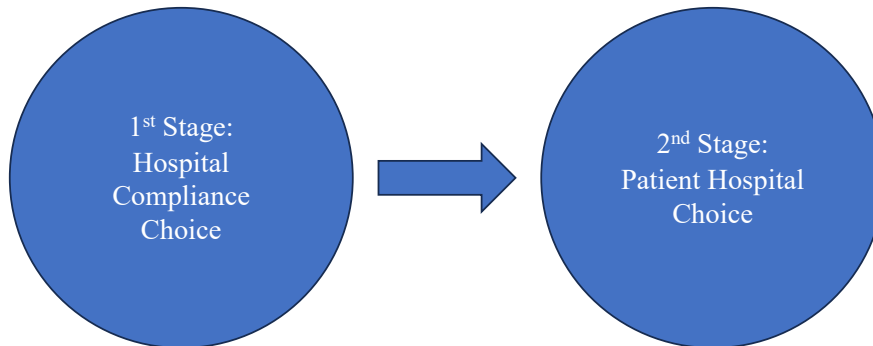
# Structural Model of Compliance and Competition



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**Network formation and patient insurance choice taken as given in model.**



# Structural Model of Compliance and Competition

For each hospital  $h$  in system  $s$  and market  $m$ , flow profits are specified as:

$$\pi_{hm} = Q_{hm}(\mathbf{p}, \mathbf{X}, \mathbf{C}, \mathbf{c})(p_h - mc_h) - \rho^f(\mathbf{C})F_h(b_h) - \Gamma(C_h, Z_h, \nu_h), \quad (2)$$

- ▶  $Q_{hm}$  captures patient demand,
- ▶  $p_h$  is a vector of prices,
- ▶  $mc_h$  is a vector of marginal costs,
- ▶  $\rho^f$  is the probability that a non-complaint hospital will be fined,
- ▶  $F_h(b_h)$  is the financial penalty as a function of hospital size,
- ▶  $\Gamma(\cdot)$  is the cost of compliance,
- ▶  $c_h$  are patient coinsurance rates,
- ▶  **$C_h$  is the compliance decision of the hospital.**

# Compliance comes at a cost

$$\Gamma(C_h, Z_h, \nu_h) = \begin{cases} \gamma_h Z_h + \nu_h & \text{if } C_h = 1, \\ 0 & \text{if } C_h = 0, \end{cases} \quad (3)$$

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Firm marginal costs are parametrized as follows:

$$mc_h = \psi_h W_h + \eta_h, \quad (4)$$

- ▶ Marginal cost is assumed to be constant in quantity, but can vary across hospital, year, and insurance type.
- ▶ Lastly, assume  $(\nu, \eta, \xi) \sim MVN(0, \Sigma)$ , where

$$\Sigma = \begin{bmatrix} \sigma_\nu^2 & \sigma_{\nu\eta} & \sigma_{\nu\xi} \\ \sigma_{\nu\eta} & \sigma_\eta^2 & \sigma_{\eta\xi} \\ \sigma_{\nu\xi} & \sigma_{\eta\xi} & \sigma_\xi^2 \end{bmatrix}$$

# Patient Hospital Choice

Patients choose a hospital  $h$  from choice set  $H_m$  to maximize utility:

$$u_{ih} = \underbrace{\beta X_{ih} - \alpha c_{ih} P_{ih}(C_h)}_{\delta_{ih}} + \xi_h + \lambda_{ig} + (1 - \sigma)\epsilon_{ih}, \quad (5)$$

- ▶  $X_{ih}$  captures hospital and patient characteristics (e.g. patient travel time and hospital quality/size),
- ▶  $\lambda_{ig} + (1 - \sigma)\epsilon_{ih} \stackrel{i.i.d.}{\sim} \text{T1EV}$ , nested at department (or MDC) level.

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$P_{ih}$ , which captures the vector of prices facing patients for care at hospital  $h$ , is the object of particular interest and takes the form:

$$P_{ih}(C_h) = \begin{cases} p_h & \text{if } C_h = 1, \\ \mathbb{E}_i[\mathbf{p}] & \text{if } C_h = 0. \end{cases} \quad (6)$$

- ▶ Will explore various distributional assumptions when  $C_h = 0$ , such as  $\mathbb{E}_i[\mathbf{p}] = \mu_m$ , market average price, or  $\bar{p}_h | H_i$  (cond. on previous visits).

# Market Demand

Nested logit errors allow us to express the probability that patient  $i$  chooses  $h$  in group  $g$  as:

$$\rho_{ih}(P_{ih}, X_{ih}, c_{ih}, C_h) = \rho_{i,h|g} \times \rho_{ig} = \frac{\exp((\delta_{ih})/(1 - \sigma))}{D_{ig}^\sigma [\sum_g D_{ig}^{(1-\sigma)}]}, \quad (7)$$

$$\triangleright D_{ig} = \sum_{h \in \mathcal{H}_g} \exp((\delta_{ih})/(1 - \sigma)).$$

Aggregate patient demand takes the following form:

$$Q_{hm}(p_h, X_h, c_h, C_h) = \sum_{i \in \mathcal{I}} \rho_{ih}(P_{ih}, X_{ih}, c_{ih}, C_h), \quad (8)$$

Parametric assumptions allow for estimation via standard MLE.

# Firm's Compliance Problem

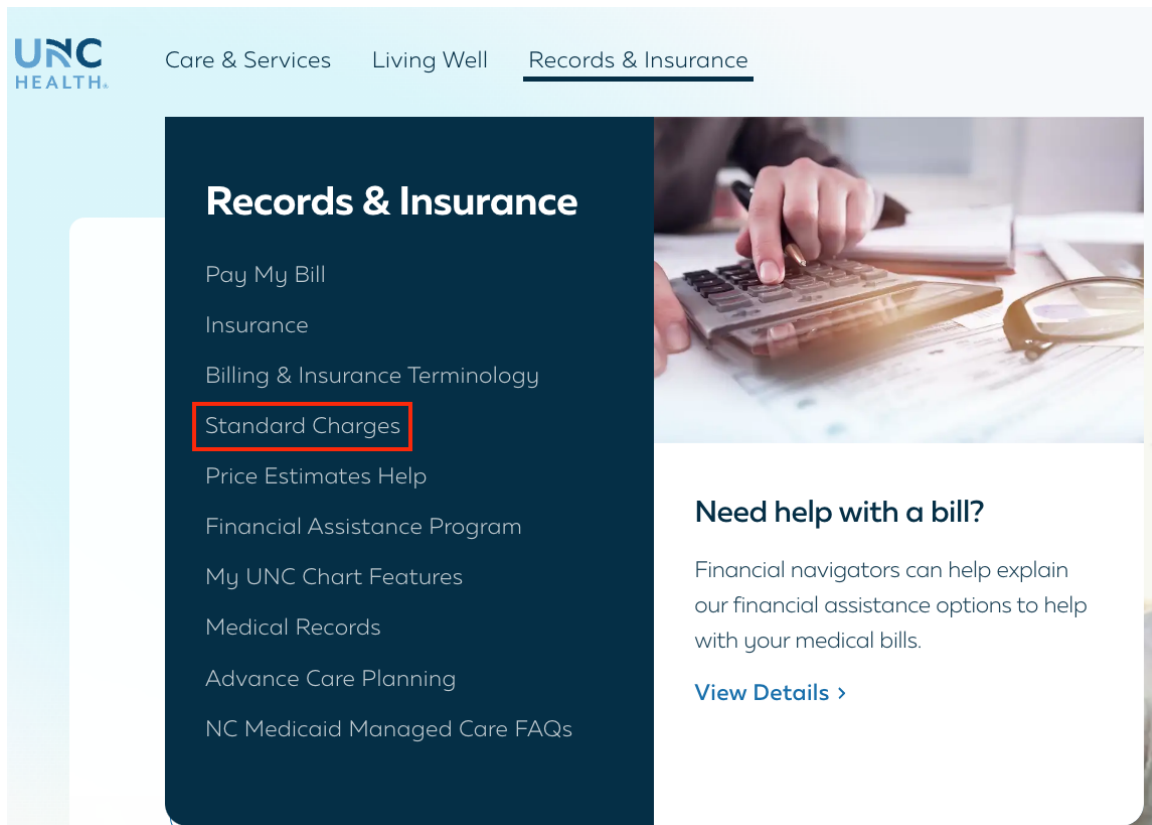
The compliance decision for all  $h$  in market  $m$  becomes:

$$\begin{aligned} C_h = 1 &\iff \pi_{hm}(1) - \pi_{hm}(0) \geq 0, \\ &\iff \Delta Q_{hm}(p_h - mc_h) + \rho^f(0)F_h(b_h) - \Gamma(C_h, Z_h, \nu_h) \geq 0, \end{aligned}$$

►  $\Delta Q_{hm} = Q_{hm}(\cdot, 1) - Q_{hm}(\cdot, 0).$

# Appendix








# Example of Price Shopping Tool at UNC Health



Homepage link to “Standard Charges”.

# Example of Price Shopping Tool (Step 2)

## Standard Charges & Shoppable Services Data by Hospital

- [UNC Hospitals](#) 
- [UNC Health Rex](#) 
- [UNC Health Wayne](#) 
- [UNC Health Lenoir](#) 
- [UNC Health Pardee](#) 
- [UNC Health Blue Ridge](#) 
- [UNC Health Rockingham](#) 
- [UNC Health Caldwell](#) 
- [UNC Health Chatham](#) 
- [UNC Health Johnston](#) 
- [UNC Health Nash](#) 
- [UNC Health Southeastern](#) 



# Example of Price Shopping Tool (Step 3)



[Home](#)   [CDM Standard Charges](#)   **[Shoppable Services](#)**

[Clear Filters](#)   Service:    Facility:    Payer:    Plan:

Facility Name	Revenue Code	revCodeCat	Ancillary Service	Charge	De-identified Minimum Neg...	De-identified Maximum Ne...	Discounted Cash Price	BCBS Blue Value
UNC Hospital	610	MRT	73718	\$3,411.00	\$223.15	\$3,411.00	\$2,046.60	1736.27

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