Hospital Heterogeneous Responses to a Blended Payment Scheme Reform and the Distributional Consequences

Wei Yan[1]   Hanmo Yang[2]   Junjian Yi[1]   Chuanchuan Zhang[3]

[1] Peking University   [2] Stanford University   [3] Zhejiang University

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Motivation and Research Question

Hospital payment schemes designed to control health expenditure could also influence the allocation of medical resources, which is crucial for efficient healthcare delivery in developing countries, where substantial health challenges persist but resources remain limited.

This paper studies

1) the effects of hospital responses to a blended payment scheme—a diagnosis-based payment scheme with a global budget, and

2) the distributional consequences of hospitals

Institutional Background

Urban Employee Basic Medical Insurance

- Covers urban employees and retirees (and their family members)

- Separately financed and managed at the <u>provincial level</u> (20%) and the <u>city level</u> (80%) in Changsha City

The 2016 Payment Scheme Reform in Changsha City

- Before: fee-for-service for both levels

- After: the city-level UEBMI changed to the diagnosis-intervention packet (DIP) payment

- DIP classifies according to diagnoses and treatment procedures → over 1,000 groups

Hospital Revenue under the Blended Payment Scheme

- Total revenue of hospital j for treating city-level patients in year t:

From the City-level UEBMI (paid at year-end)   From patients' OOP

$$TR_{jt} = TS_{jt} \times \rho_t + p_{jt} \times N_{jt}$$

total number of admissions

total score

price of one score point

average OOP expense per admission

$$TS_{jt} = \left(\sum_{c \in C_j} s_{cjt} \times S_{cjt} \right) \times N_{jt}$$

$$\rho_t = \frac{B_t}{\sum_{j \in J} TS_{jt}}$$

regional global budget

average score per admission within category c

share of admissions classified in diagnostic category c

Data and Method

Administrative UEBMI enrollment and claim data in Changsha, 2014-2017

- Enrollment data: enrollees' demographic characteristics

- Claim data: detailed information on each inpatient admission -- admission and discharge date, diagnostic codes (ICD-10), treatment procedures, and bills

- Hospital information; DIP scores

DID

- city-level admission (treatment) v.s. provincial level admission (control)
- before and after 2016

How Did Hospitals Respond to the Reform?

$$TR_{jt} = \boxed{TS_{jt}} \times \rho_t + p_{jt} \times N_{jt}$$

1. **Upcoding** (S_{cjt})

- Classify patients into groups with a higher

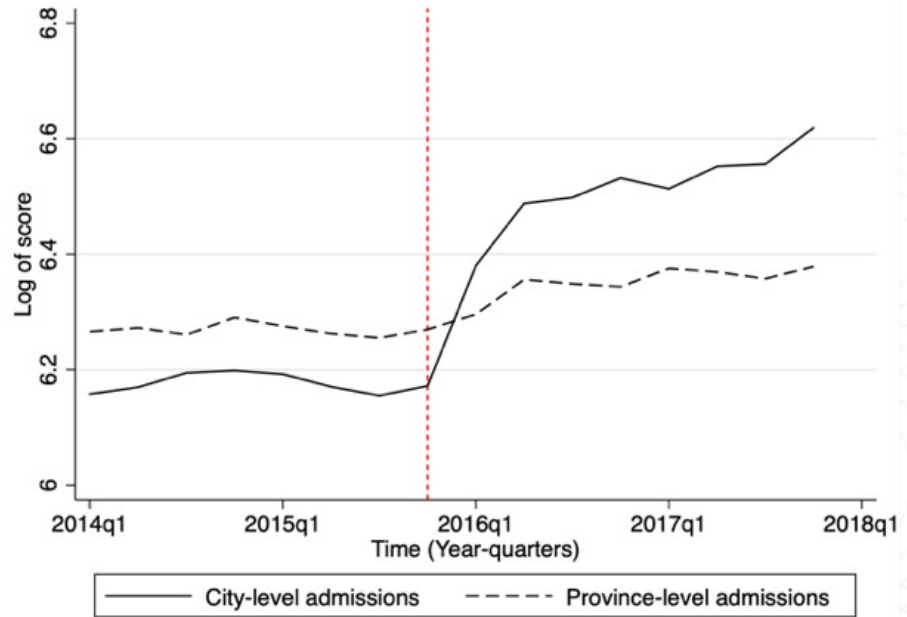 reimbursement level **→ Yes**

Fig. Mean score per admission by quarter

How Did Hospitals Respond to the Reform? $TR_{jt} = \boxed{TS_{jt}} \times \rho_t + p_{jt} \times N_{jt}$

1. **Upcoding (S_{cjt})**

- Upcode cases to a greater extent in categories with higher <u>upcoding potential</u> → Yes

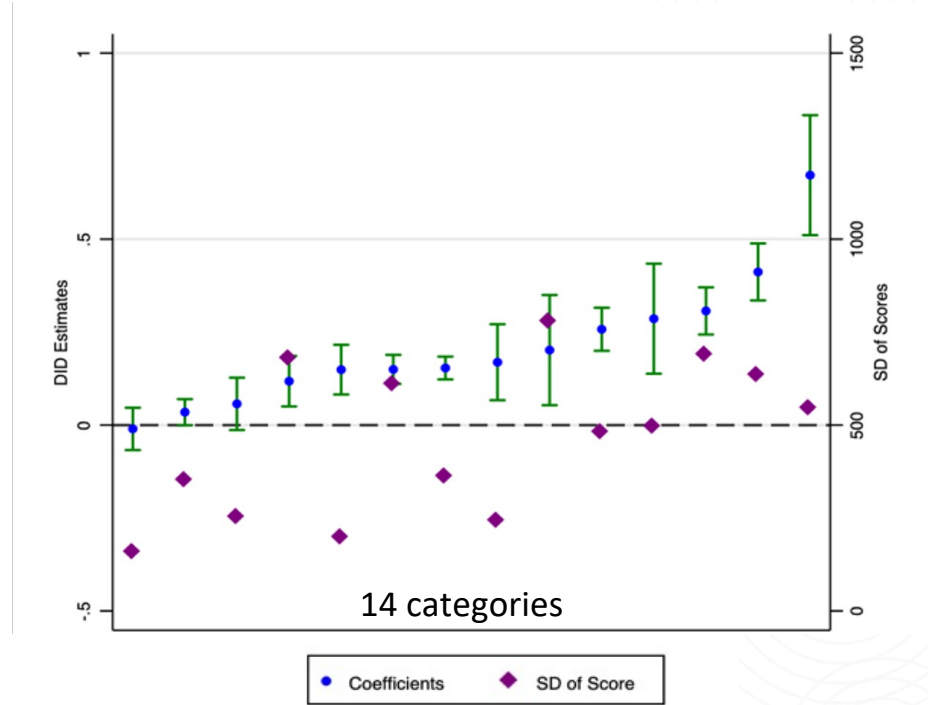- Upcoding potential: standard deviation of DIP scores within the category

Fig. Estimates of upcoding and score dispersions across categories

How Did Hospitals Respond to the Reform?

$$TR_{jt} = \boxed{TS_{jt}} \times \rho_t + p_{jt} \times \boxed{N_{jt}}$$

2. **Patient Composition across Categories**

(s_{cjt})

Admit more cases in categories with

higher upcoding potentials → Yes

3. **Number of Admissions (N_{jt})**

Admit more patients (from ER or outpatient
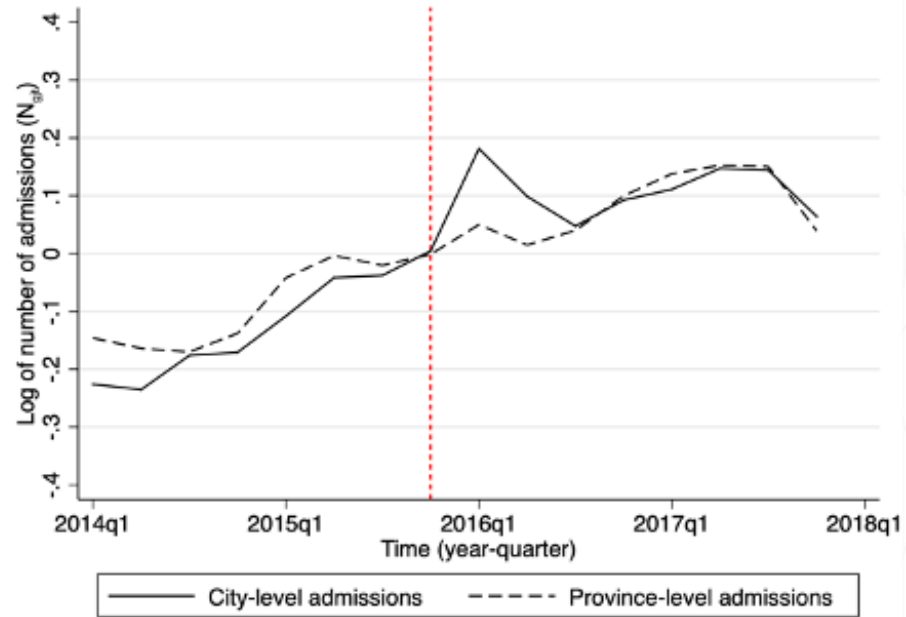
departments) → Yes, for 1 year

Fig. Number of admissions per hospital by quarter

How Did Hospitals Respond to the Reform?

$$TR_{jt} = TS_{jt} \times \rho_t + \boxed{p_{jt}} \times N_{jt}$$

4. **Out-of-pocket (OOP) expenses (p_{jt})**

Increase out-of-pocket expenses from patients → No

5. **Medical Services**

Adjust medical services to reduce medical costs → No

- **Spillover** → No

  - physicians are able to perfectly distinguish city-level admissions from province-level admissions

  - hospitals may not adjust investments according to their revenue, at least in the short run

What's the role of the Global Budget?

$$TR_{jt} = TS_{jt} \times \boxed{\rho_t} + p_{jt} \times N_{jt}$$

$$\rho_t = \frac{B_t}{\sum_{j \in J} TS_{jt}}$$

- **Cournot competition**: hospitals make decisions before knowing the price of one score point (ρ_t)

- ρ_t is determined by the collective response of all hospitals

- $\sum_{j \in J} TS_{jt} \uparrow \rightarrow \rho_t \downarrow \rightarrow TR_{jt}$?

- Without collusion, every hospital is eager to raise its total score (TS_{jt}) if it rationally expects other hospitals to do the same

   $\rightarrow$ escalates the hospital responses

Distributional Consequences
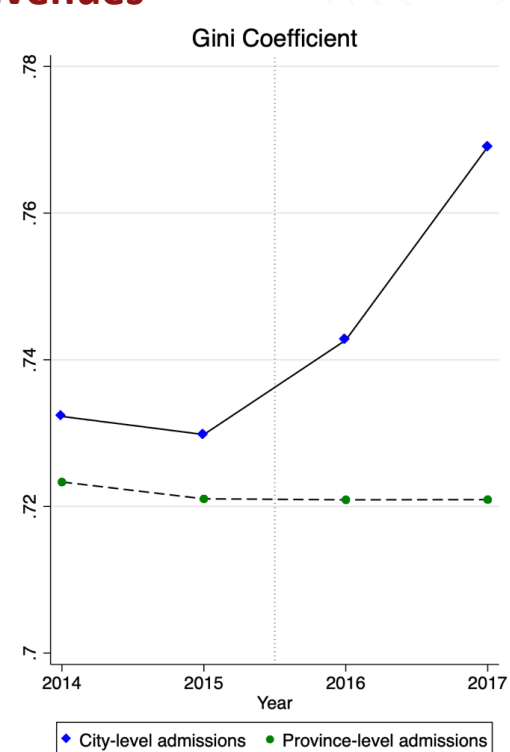
$$TR_{jt} = \boxed{TS_{jt}} \times \rho_t + p_{jt} \times \boxed{N_{jt}}$$

Increase in the disparity in total scores, payment, and revenues

- Mainly driven by heterogeneous responses of hospitals in

  a) Number of admissions

  b) Extent of upcoding
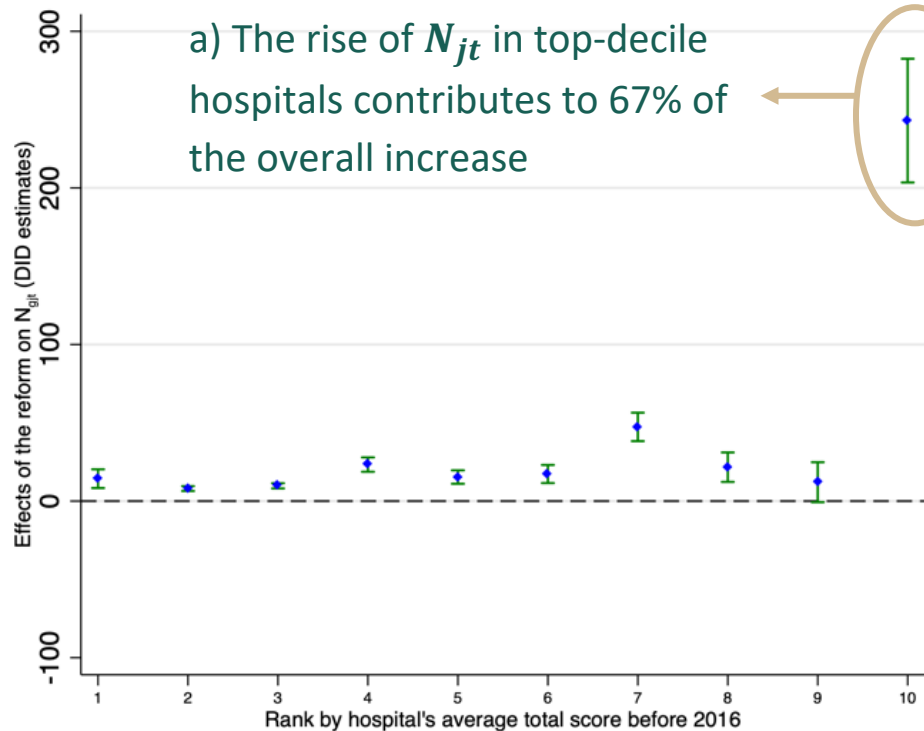
Distributional Consequences

$$TR_{jt} = TS_{jt} \times \rho_t + \boxed{p_{jt} \times N_{jt}}$$

Increase in the disparity in total scores, payment, and revenues

- Mainly driven by heterogeneous responses of hospitals in

  a) Number of admissions

  b) Extent of upcoding

a) The rise of N_{jt} in top-decile hospitals contributes to 67% of the overall increase
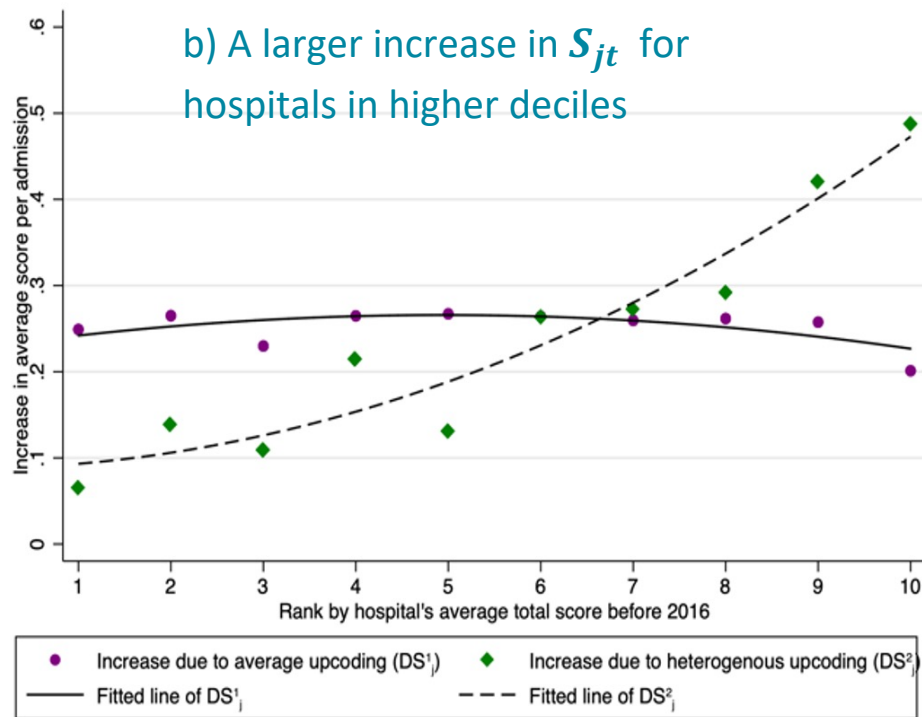
Distributional Consequences

$$TR_{jt} = \boxed{TS_{jt}} \times \rho_t + p_{jt} \times N_{jt}$$

Increase in the disparity in total scores, payment, and revenues

- Mainly driven by heterogeneous responses of hospitals in

 **a) Number of admissions**

  b) Extent of upcoding

b) A larger increase in S_{jt} for hospitals in higher deciles

Y-axis: Increase in average score per admission

X-axis: Rank by hospital's average total score before 2016

Legend:
- Increase due to average upcoding (DS^1_j)
- Increase due to heterogenous upcoding (DS^2_j)
- Fitted line of DS^1_j
- Fitted line of DS^2_j

Distributional Consequences

➜ **More powerful hospitals end up better off**

Hospitals with

- more knowledge about coding practices,
- greater exposure to the reform,
- higher tier, and
- larger size

respond more strongly

N_{jt}

TS_{jt}
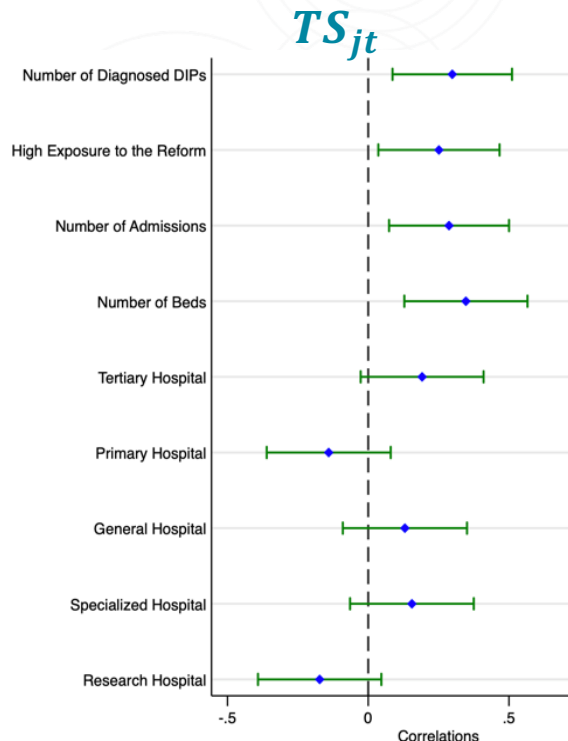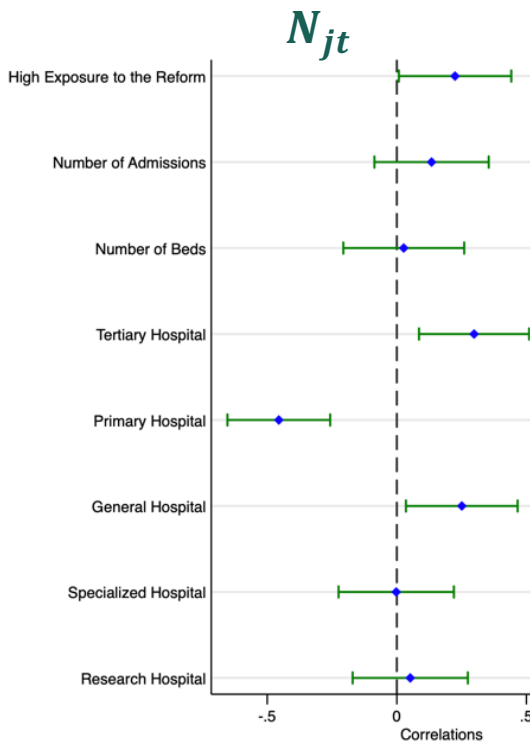
Patient Welfare

- Exacerbate the overcrowding of tertiary hospitals, while leaving primary hospitals underutilized

- No evidence of negative short-term impacts on readmission rates

Key Messages

- Hospitals respond strongly to the blended payment scheme reform along multiple dimensions

- Leads to a larger share of the social health insurance fund being directed to hospitals that are more adept at gaming the system

→ Inefficiency in healthcare inputs and delivery

Thanks! Questions?

hmyang@stanford.edu