

PROVIDER STRATEGIC RESPONSES TO A BLENDED HOSPITAL
PAYMENT REFORM IN CHINA: EVIDENCE ON PATIENT
SELECTION, SERVICE ADJUSTMENT, AND PRICE MANIPULATION

HPR55

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BACKGROUND

China’s Healthcare Security-Diagnosis Related Group (CHS-DRG) system, the country’s **first nationwide DRG-based payment** reform, was piloted in city A on November 1, 2021.

- The reform combines DRG-based payments with **a global budget and ex post price adjustments**, generating mixed provider incentives.

OBJECTIVES

The study aims to evaluate provider strategic behaviors elicited by the CHS-DRG program, concentrating on **patient selection, service adjustment, and price manipulation** (Fig. 1).

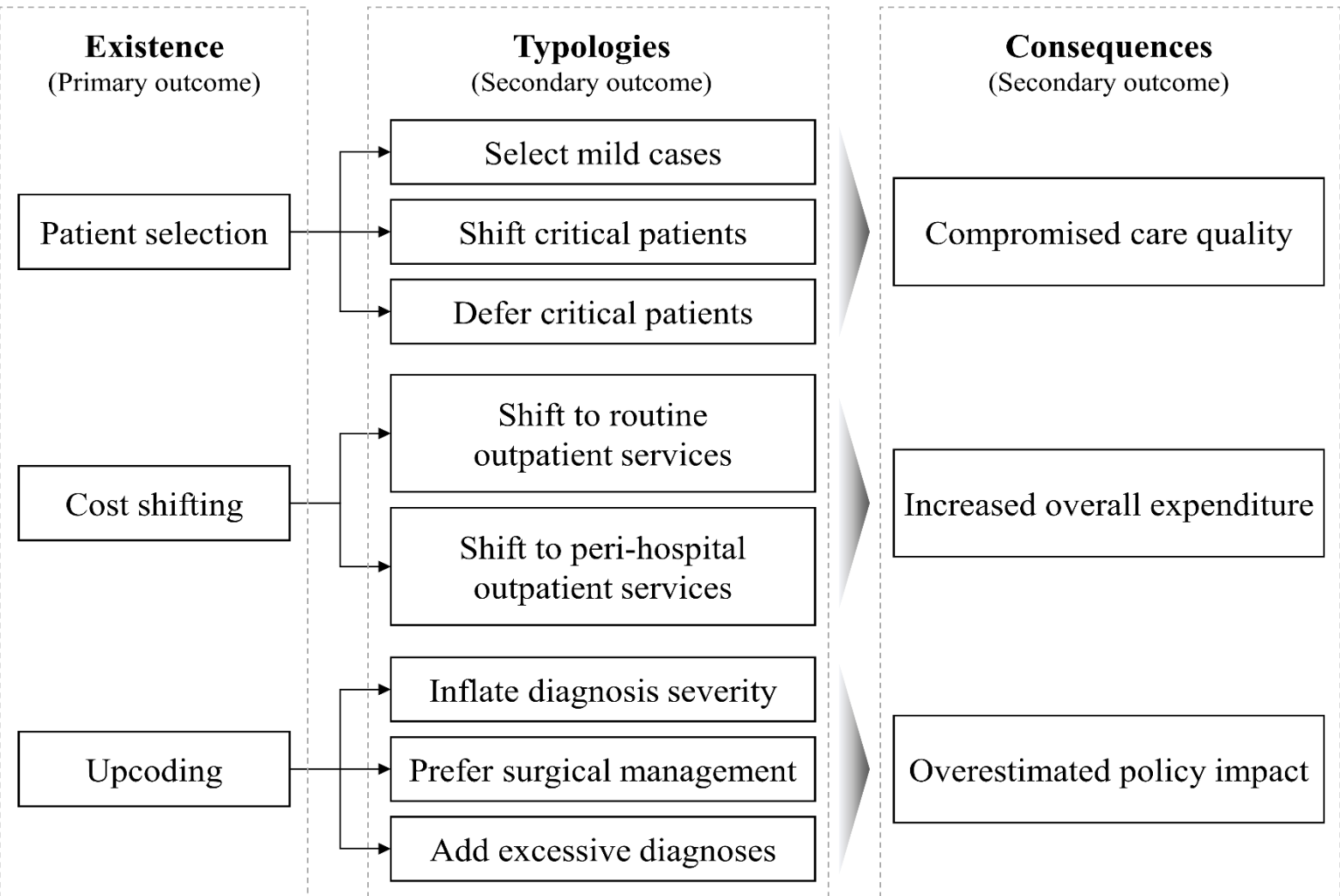


Fig. 1 Conceptual Framework for Analyzing Strategic Behavior

METHODS

We employed a controlled, population-based natural experiment using claims data from November 2020 to September 2022, including 932,354 inpatient cases from pilot hospitals (intervention) and 608,940 matched cases from non-pilot hospitals (control).

Guided by McGuire’s Physician Utility Theory, **difference-in-differences (DID)** and **logistic regression** models were applied to identify the **existence, typologies and consequences** of unintended care. DID model was specified:

$$g(Y_{iht}) = \alpha + \beta_1 Policy + \beta_2 Post + \beta_3 Policy \times Post + \gamma X_{ih} + Month_t + \varepsilon_{iht} \quad (1)$$

- One-part **generalized linear models** were used at the case level and **generalized estimating equations** at the hospital-month level.

- We conducted pre-program tests to validate the parallel trends assumption (Fig. 2).

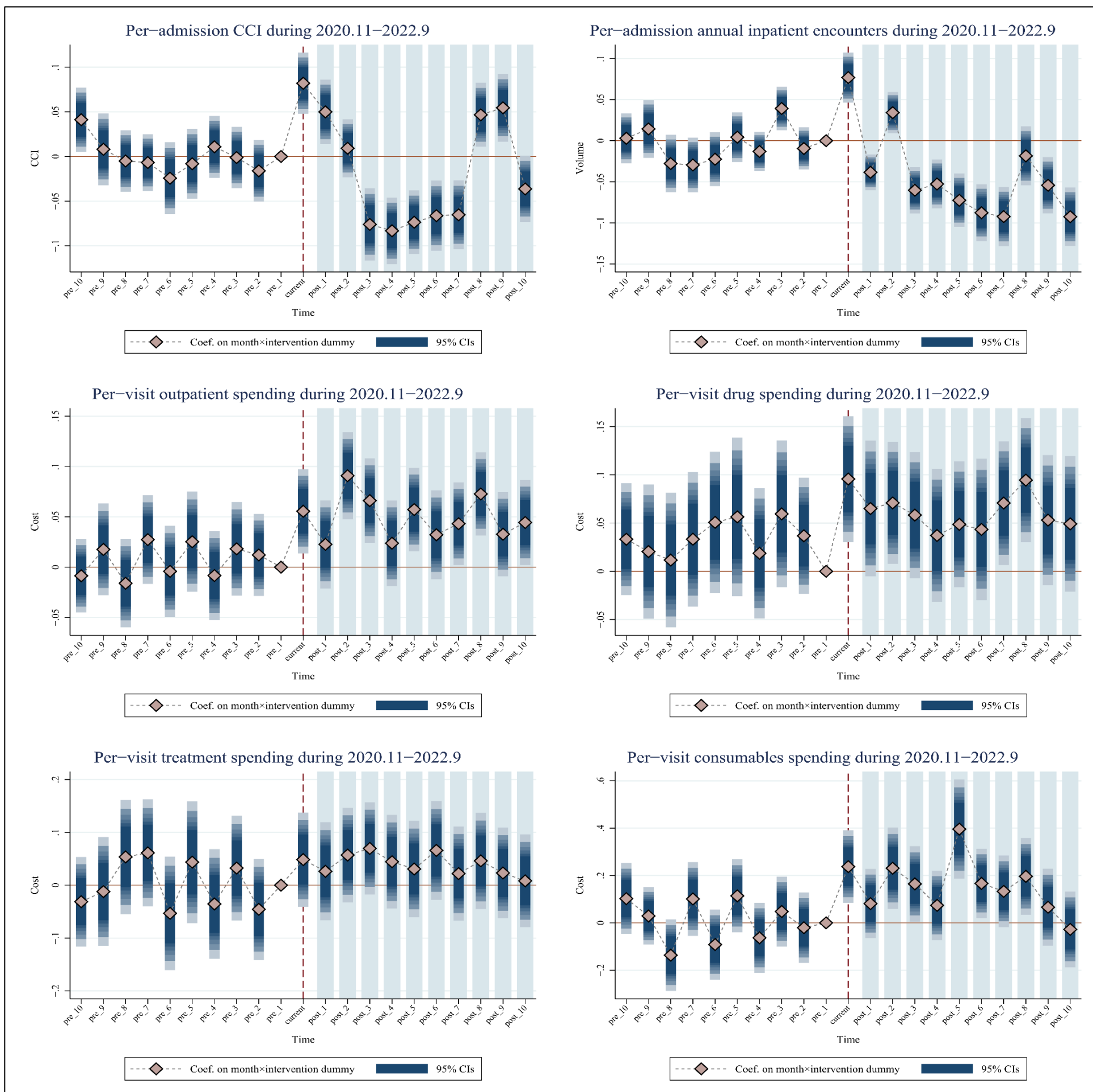


Fig. 2 Event-Study Estimates of Monthly Differences Between Groups

Logistic regression models were used to examine factors associated with two binary outcomes: (1) the likelihood of being coded with complications, and (2) the likelihood of exclusion from DRG-based payment (among pilot hospitals only). To assess the association between DRG severity coding and payment incentives, we estimated:

$$logit \left(P(Y_{i,h,t,g=1}) \right) = \beta_0 + \beta_1 diff_{CC-w/o\ CC} + \beta_2 diff_{MCC-w/o\ MCC} + \beta_3 diff_{MCC-CC} + X_{i,g,h} + Month_t + \varepsilon_{i,g,h,t} \quad (2)$$

Marginal admission was measured through Charlson Comorbidity Index (CCI) and annual hospitalizations. **Cost-shifting** was assessed by outpatient spending and visits near admissions. **Upcoding** was examined via complication coding proportions (Table 1).

Table 1. Conceptual Framework with Corresponding Outcome Indicators

Category	Typology	Consequence
Patient selection	Select mild cases	CCI, Annual number of hospitalizations, Per-admission inpatient spending of cases actually enrolled in DRG scheme
	Shift critical patients	
	Defer critical patients	
Cost-shifting	Shift to routine outpatient services	Per-admission spending of excluded cases, Per-admission spending of unclassified cases
	Shift to peri-hospital outpatient services	
	Inflate diagnosis severity	
Upcoding	Prefer surgical management	Inter-hospital transfer rate
	Add excessive diagnoses	

RESULTS

Patient selection was a prominent strategy.

Table 2. Testing the Existence and Typologies of Patient Selection

Outcome Variables	Adjusted Difference-in-Differences Effects	95% CI	P value
Select mild cases			
CCI	-0.03 (-3.34%)	-0.05, -0.02 (-4.9%, -1.76%)	<0.001
Annual number of admissions	-0.11 (-4.73%)	-0.15, -0.06 (-6.68%, -2.78%)	<0.001
Per-admission inpatient spending of cases actually enrolled in the DRG scheme, CNY	-1,429.59 (-7.67%)	-1,629.37, -1,229.80 (-8.69%, -6.65%)	<0.001
Per-admission inpatient spending, CNY	-308.61 (-1.63%)	-504.25, -112.98 (-2.66%, -0.61%)	0.002
Shift critical patients			
Per-admission spending of excluded cases, CNY	3,537.71 (18.34%)	3,267.38, 3,808.05 (16.87%, 19.81%)	<0.001
Per-admission spending of unclassified cases, CNY	8,102.34 (41.95%)	7,646.60, 8,558.08 (39.57%, 44.33%)	<0.001
Defer critical patients			
Inter-hospital transfer rate, %	0.01 (0.99%)	-0.04, 0.05 (-7.60%, 9.58%)	0.821

Cost shifting from inpatient to routine and peri-hospital outpatient services was evidenced.

Table 3. Testing the Existence and Typologies of Cost Shifting

Outcome Variables	Adjusted Difference-in-Differences Effects	95% CI	P value
Shift to routine outpatient services			
Per-visit outpatient spending, CNY	12.35 (4.45%)	8.78, 15.92 (3.13%, 5.78%)	<0.001
Per-visit outpatient out-of-pocket payments, CNY	3.69 (2.74%)	1.94, 5.43 (1.42%, 4.06%)	<0.001
Per-visit outpatient insurance reimbursements, CNY	12.92 (8.47%)	10.26, 15.57 (6.61%, 10.32%)	<0.001
Shift to peri-hospital outpatient services			
Proportion of outpatient visits within 3 days before admission and 3 days after discharge, %	3.33 (9.32%)	2.98, 3.68 (8.31%, 10.33%)	<0.001
Volume of outpatient visits within 3 days before admission and 3 days after discharge	0.05 (8.07%)	0.05, 0.06 (6.85%, 9.28%)	<0.001

Upcoding through inflating diagnosis severity was reflected by the **increased complication coding** (OR=1.49, *P*<0.001), particularly in high-weight DRGs.

Table 4. Testing the Existence and Typologies of Upcoding

Outcome Variables	Adjusted Difference-in-Differences Effects	95% CI	P value
Prefer surgical management			
Proportion of admissions involving surgery, %	2.32 (5.99%)	2.00, 2.64 (5.14%, 6.8%)	<0.001
Number of surgeries per admission	0.00 (0.37%)	-0.00, 0.01 (-0.02%, 0.77%)	0.065
Add excessive diagnoses			
Number of diagnoses recorded per admission	-0.02 (-2.05%)	-0.02, -0.02 (-2.28%, -1.82%)	<0.001

Consequences of provider strategic behavior are shown in Fig. 3.

CONCLUSION

Timely DRG updates, refined risk adjustment, and intelligent oversight are essential to curb strategic behavior and sustain reform goals.

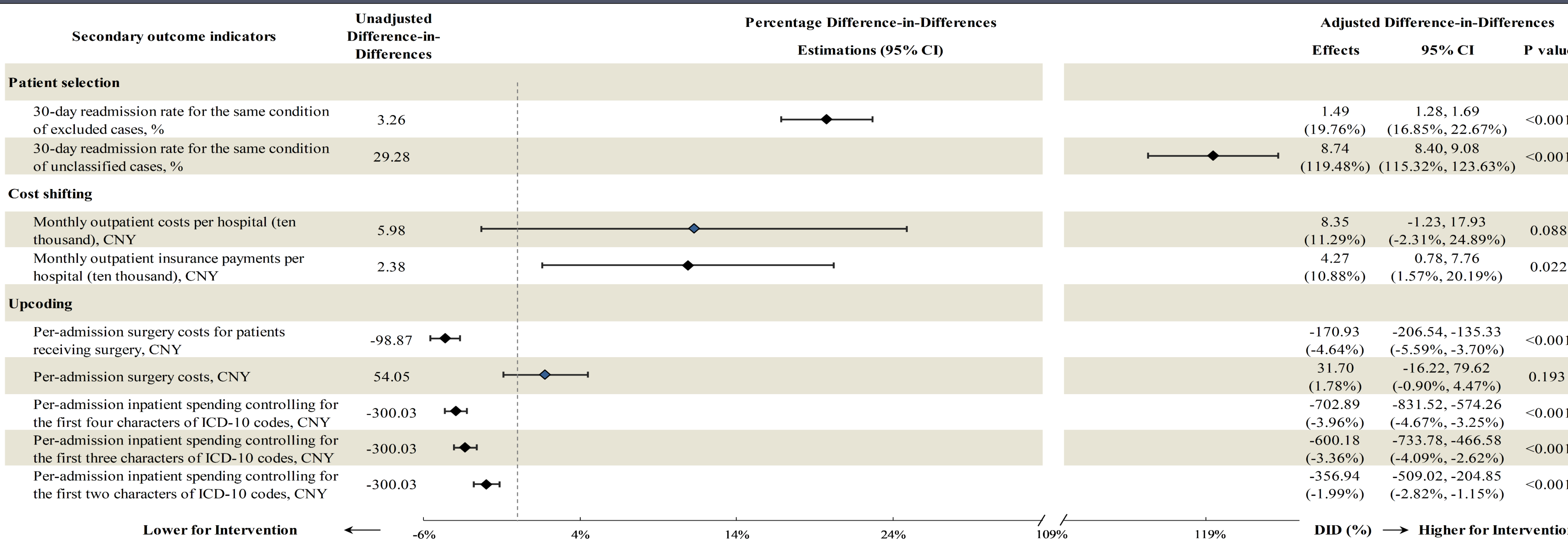


Fig. 3 Testing Consequences of Patient Selection, Cost shifting and Upcoding: DID Estimates