

# Diffusing Innovations Under Market Competition: Evidence from Drug-Eluting Stents

Ginger Zhe Jin<sup>1</sup> Hsienming Lien<sup>2</sup> Xuezhen Tao<sup>3</sup>

<sup>1</sup> University of Maryland & NBER

<sup>2</sup> National Chengchi University & CIER

<sup>3</sup> Shanghai University of Finance and Economics

Discussant: Lucy Xiaolu Wang

University of Massachusetts Amherst; MPI - innovation; CCHE

# Main message and contribution

---

- Research Q: How *market competition* and *reimbursement design* affect the diffusion of medical innovation, focus on drug-eluting stents (DES) in Taiwan
- Approach: structural model of D & S, rich data & counterfactuals
  - Patient demand: mixed logit over stent choices, rich r.c. w patient char.
  - Hospital supply: two-stage game 1) stent portfolios, 2) price competition
- Results: competition lowers prices, weakens new tech adoption
  - *selective contracting*: quad. win (esp concentrated); *higher reimbursement ↑ adoption* (esp competitive) & *fiscal costs*; *targeted subsidy*: limited spillover
- Contributes to several strands of literature in IO, innovation, insurance, contracting, ...; already very polished paper!



# 1. Main results: broader interpretation

---

- Measure of “newness” within brand, which may differ from effectiveness
  - Hard to cross-brand compare, but newest CD (07) is older than oldest BS (10)
  - Ideas: (1) a proxy of overall newness/clinical-effectiveness? E.g., based on info noted in footnote 1, HTA, or US premarket approval (PMA) reports?
  - (2) (alt.) control for clinical quality metrics (coating materials, strut-thickness, polymer type) to separate new from better?
  - Minor Q: why combine gen 4-5 SB stents (when the coating materials are different)?
- ~ 70% Taiwanese hold private insurance (in 2025): DES coverage?
  - How did private insurance cover DES during the sample period?
  - Probably very hard to get such info, and may not affect the main results, but can be relevant to the equity-based patient coupon CF (e.g., subsidy choices)



## 2. Counterfactuals: additional thoughts

---

- Selective contracting: non-contracted DES brands become fully OOP
  - Simulation based on two market leaders (not HTA), is it realistic?
  - May face practical challenges. What if the NHI use tiered copayments (lower for contracted brands) rather than full exclusion?
- Practical policy Q on manufacturer's participation (when not TILI)
  - (Table 10) manufacturers prefer mid-range  $r^c$  (cost factor) when take-it/leave-it
  - In practice, would NHI run an auction or negotiation? How the equilibrium  $r^c$  under different procurement mechanisms may vary relative to benchmark?
- (Extension): counterfactuals w/ value-based reimbursement adjustments?
  - NHIA amended the balanced-billing rules 2020 reward high-qual. devices
  - The model would still work, but can be a cool CF or future paper (w more data)



# Minor suggestions/future extensions

---

- DRG related payment reforms during sample period in 2010
  - Do hospital need to profit max over product and procedure costs in a DRG?
- Price IV: can exchange rate gen diff. brand-level shocks/passthroughs?
  - Footnote discuss the exclusion restriction, or robustness w/o this (over-id) IV?
- Control fcn: 0 residual for all new unit combo, no unobserved quality diff.
  - Robustness: impute residuals based on brand fixed effects from the first stage?
- Figure 7 is informative but hard to discern the differences btw subplots
  - E.g., status quo (a) looks like both BMS & DES are reimbursed, (c) hard to read
- Eqn (1) distance measure: straight-line vs. great-circle (spherical) distance
  - Maybe they are similar, or robust using greatCircleDistance (MATLAB fcn)



# Final thoughts

---

- Very cool topic, lots of food for thought
- Key takeaway: hospitals as *strategic intermediaries* play a critical role in *innovation diffusion*, and effective policy must manage the tension btw competitive pricing and adoption incentives
- Main thoughts: clarify some institutional nuances, and explore selective contracting variants (non-exclusive, tiered design) that might achieve wins without requiring concentrated markets.
- Very polished paper; looking forward to the final version!

