Discussion of *Trading Trash on Tricycles* by Banares-Sanchez and Wiskamp

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Overview

Can policy interventions mitigate waste-related environmental harms?

- Fresh, creative topic.

How

- Model of waste collection and disposal.
- (Impressive) Primary data collection.
- Counterfactuals.

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Five main comments

- Borla Taxi conduct.
- Demand estimation.
- Counterfactuals, mechanisms, and estimates.
- The externality curve.
- Choice of counterfactuals.

Borla Taxi Conduct

Competitive tricycle market?

- Identifying the model of competition is a classic problem in IO.
  - Bresnahan (1982), Bresnahan (1987), . . . , Duarte, Magnolfi, Solvsten, and Sullivan (2024).
- Stable prices are consistent with
  - Symmetrically differentiated tricycles.
  - Collusion.
- Does it matter?
  - It might. Subsidy pass-through depends on tricycle conduct.
- How to address?
  - Formal tests? DMSS, Backus, Conlon, and Sinkinson (2021).
  - Industry description: associations, tricycle fleets?

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Typical identification challenge:

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This paper: no ξ^c_{ao} or ξ^d_{aj}.

Demand for collection

- Experimental variation in characteristics; correlation is not the issue.
- But there might still be *misspecification*.
- Solutions:
  - Data should allow area-by-alternative FEs.
    - $\rightarrow$ Potential issue of extrapolation to a's not in the experiment.
  - And/or show how well you fit spatial variation in collection mode shares.

Route Choice

$$U_{iaj} = \nu_1 \Pi_{aj} + \nu_2 \tau_{hajh} + \nu_3 T_j + \xi_{aj} + \varepsilon_{iaj} \ ,$$

where

$$\Pi_{aj} = (p_a - p_j^d + r_j) q_{aj} - C(q_{aj}) \quad \text{and} \quad h = h(i)$$

- Disposal site unobservables may correlate with p_j^d, r_j: endogeneity.
- Area unobservables will correlated with equilibrium p_a, q_{aj}: endogeneity.
- Low-hanging fruit: drop wait time T_j, include j-FEs.
- More?
  - $\xi_a + \xi_j$ may be reasonable. Enough data?
  - ξ_{aj} feasible with collection demand shifters:
    - → BLP IVs: characteristics and availability of other collection modes in area a.

From Estimates to Subsidy Counterfactuals

$$\downarrow P_j^d \implies \Delta\text{BT disposal choices} + \downarrow P_{a,BT} \implies \uparrow \text{BT usage} \implies \downarrow E^{area}, \uparrow E^{dump}$$

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- BT price elasticities?
  - Show them.
  - Catchment area intuition suggests they should be low.
  - Joint estimation, not needed for identification, may prop them up.
  - Estimates without supply-side?
  - How do elasticities depend on TS & dumpsite proximity?
    - → Potential complementarity between location/infrastructure policies & pricing policies.

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- Pass-through.
  - Perfect competition pins this down.
  - Warranted? See comments above.

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- Balance between $\downarrow E^{area}$ and $\uparrow E^{dump}$ depends on *diversion ratios/cross-elasticities*.
  - Do BTs gain market share from burning/dumping or formal alternatives?

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  - Do BTs gain market share from burning/dumping or formal alternatives?
  - Logit/IIA assumption doing all the work here.
  - Nested logit attempted. But ...
    - → Are you just missing the right variation?
    - → Usual intuition: vary the choice set. Berry and Waldfogel (1999).
    - → Choice set variation in observational data, not in experiment.
  - Magnitude of this effect also depends on BT price elasticities (see above).

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Three considerations

1. Functional form.
   - Would **convex** not be more reasonable? E.g., flooding.
   - Does it matter?
     - → It could: counterfactuals involve large changes in dumped waste.
     - → Environmental benefit could be over-estimated.
   - If $E_{area} = f(\text{Waste})$, **spatial distribution** of waste matters.
   - Robustness?

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3. Environmental damages are costly to reverse.
   - How do we account for externalities on future generations?

Subsidy Counterfactual

Headline **50%** subsidy leads to large increase in waste disposed of at transfer stations (TSs).

- Is this feasible? Capacity constraints at TSs?
- Why are prices so wrong? Any insight from government officials?

Why focus on uniform subsidies?

- Cross-price elasticities vary in space due to competition between disposal sites.
- Thus, may be optimal to subsidise more TSs closer to dumpsites.
  - Also because of heterogeneity in damages ζ_j [shut down in calibration].
- **Suggestion**: solve the second-best problem $\max_{p_j^d : j \in TS} W(\cdot)$.

Infrastructure Counterfactual

Location of additional transfer stations is taken as given.

- Model strength, substitution patterns in space, not used.

- Are the proposed locations optimal?
  - Greater environmental benefits if placed in close proximity to dumpsites?
  - Even greater if close to Borla taxis home locations?
- Policy complementarity/substitutability?
  - Figure 18 suggests policies are *substitutes* in terms of environmental benefits.
    - → Highlight it.
    - → Still true in alternative locations?
- An important technicality
  - Adding a disposal options gives collectors *many* more ε_{iaj}!

Conclusion

- Great paper, and it will get even better!

Good luck on the market!