Motivation & Research Question

- Existing literature focuses on taxes imposing the same amount on all products in the market, but some taxes are asymmetric (e.g., environmental taxation or special taxes on big tech platforms).
- Since the equilibrium responses to asymmetric taxes are going to affect the relative prices of different products in the market, asymmetric taxes can have large effects on competition and market outcomes.
- The main purpose of this paper is to study empirically the pass-through and the effects on market outcomes of a tax levied on ride-sharing platforms but some taxes are asymmetric (e.g., environmental taxation or special taxes on big tech platforms).
- Since ride-sharing platforms are peer-to-peer marketplaces, empirically studying pass-through in this setting is another relevant question explored in this paper.

Tax Pass-through in Online Two-sided Markets

- Indirect network effects between drivers and riders may affect pass-through rates because the reduction in demand following a tax levied on riders, reduces drivers willingness to work for the platforms, shifting supply inwards and further increasing equilibrium prices.
- Two-sidedness of the market combined with the fact that ride-sharing companies are multi-product firms offering two competing services (single and shared rides) can rationalize tax overshifting.
- Since demand for ride-sharing and taxis at least partially overlaps, the larger the change in the price of ride-sharing for riders, the larger the increase in demand for traditional cabs.

This Paper in a Nutshell

1. Estimate effect on trip prices and tax-pass-through rates: pass-through in peer-to-peer marketplaces
2. Estimate effects on the number of ride-sharing and taxi equilibrium pickups: substitutability between traditional taxis and ride-sharing
3. Estimate effects on congestion
4. Estimate welfare effects of the tax by developing and calibrating a logit demand framework that accommodates asymmetric tax schedules

The Chicago Congestion Tax

Heterogeneous schedule depending on trip endpoints (whether or not the rides starts/ends in the downtown area, where congestion is more pronounced, and on the service (single or shared):

<table>
<thead>
<tr>
<th>Product</th>
<th>Downtown</th>
<th>Non-Downtown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fare</td>
<td>$0.25</td>
<td>$2.95</td>
</tr>
<tr>
<td>Shared</td>
<td>$0.75</td>
<td>$3.75</td>
</tr>
</tbody>
</table>

Data

- Trip-level data for taxis and ride-sharing (miles, duration, fare, pick-up and drop-off date, time, location, etc.) from Chicago Data Portal
- Daily afternoon traffic from the National Weather Service Forecast Office

Descriptive evidence on Price Changes after the Tax

- $0.65 ($0.07) $3.00 ($2.28) $1.25 ($0.53)

Empirical Framework

- Congestion tax implemented on the first Monday after holidays: Seasonality may bias results if not accounted for
- Pool together two subsamples: Sample 19-20: includes 29 days on either side of the actual policy date (1/6/2020); Sample 19-20: includes 29 days on either side of the actual policy date (1/6/2020)
- A difference-in-regression-discontinuity design allows to "subtract" post-holiday effect and isolate the effect of the tax

Baseline specification is:

\[ Y_i = \alpha_0 + \alpha_1 \cdot \text{Placebo}_{1} + \beta \cdot \text{Policy}_{1} + \gamma \cdot \text{Data}_{1} + \gamma_2 \cdot \text{Data}_{1} \cdot \text{Policy}_{1} + \gamma_3 \cdot \text{Data}_{1} \cdot \text{Placebo}_{1} \cdot \text{Policy}_{1} + \epsilon_i \]

where: \( \text{Data}_{1} \) measures the days from the hypothetical or actual policy date, \( \text{Policy}_{1} \) is a dummy equal to 1 after 1/6/2020 and \( \text{Placebo}_{1} \) is a dummy equal to 1 after 1/7/2019 or 1/6/2020

Conclusion

- Pass-through above unity for single rides: consistent with (i) two-sidedness of the market; (ii) ride-sharing companies are multi-product firms
- Tax shifted demand back to taxis in downtown where competition between ride-sharing and traditional taxis is more intense
- No significant effect on congestion
- Tax reallocates share of producer surplus from ride-sharing platforms to taxis but harmed riders with a loss in surplus of

Asymmetric Taxation, Pass-through and Market Competition: Evidence from Ride-sharing and Taxis

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