Driving the Drivers
Algorithmic Wage-Setting in Ride-Hailing

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Market Power in Two-Sided Labor Platforms

Unique platform sources of market power:

Data Collection

- Cost discovery via repeated observation (data also proprietary)

Temporal Price Discrimination

- Workers value flexibility, may conflict with platform objectives
- "Extract" this value by only subsidizing less preferred hours

Network effects and Lock-in

- Non-linear incentives (e.g. Uber, Lyft) induce switching costs
- Reputation scores, gamification, learning-curves

This paper: what happens when platform offers better assignments for workers who serve market during certain (high cost) hours?

Model

Model elements

- Consumers: CES demand $D(p_t)$
- Platform: Chooses assignment rule s_t: share of orders assigned to type τ and common ride price p_t to clear markets.
- Drivers: Choose schedule: type τ and hours j.

$$W_t = \sum_{t,n} \underbrace{Q(\text{riders arriving in } t)}_{D(p_t)} \cdot \underbrace{Pr(\text{assigned to rider})}_{s/N} \cdot \underbrace{\text{payment}}_{p_t \cdot (1-r)}$$

Effect of cross-hours driver incentives

- Drivers hurt by menu option: -0.5% welfare (vs. no type discrimination)
- Platforms: more control over labor mkt.: can $\downarrow$ p, $\uparrow$ profit 1.42%.
- Driver schedules less flexible (i.e. incentive works)

Comment: assignment vs. wage setting?

In model, driver reimbursements are isomorphic to assignment rule

Current spec ...

$wage_t^\tau = (1 - r) \cdot s_t \cdot revenue_t \quad \rightarrow \quad r$ fixed, s_t variable

equivalent to ...

$wage_t^\tau = (1 - r_t^\tau) \cdot s \cdot revenue_t \quad \rightarrow \quad r$ variable, s fixed

Then why would platform choose assignments? Some possibilities:

1. Opaque: keeps information private by limiting price signals
2. They may induce stronger inter-temporal commitment
   - Limit idle time in which quit decision might be made
   - E.g., assign "long trips" during periods of high opportunity cost)
3. Control match quality (e.g match H-drivers w/ 5$\star$ riders)
   - Benefits high value drivers and consumers

Comment: Market Clearing

Market with "Match Quality"

- Quality: lower ETA, ratings, driver destinations, etc.
  - p_t, z_t product price, quality
  - r_t, s_t driver reimbursement, matching rule
- Demand: $D(p_t, z_t)$, Supply: $S(r_t, s_t)$
- What are the equilibria?
  - Under some parameterizations: (infinitely?) many ways to clear markets
  - Question is, how the platform selects among these equilibria
  - Should relate to relative elasticities w.r.t. p_t, z_t, and cost of providing quality.