

# *Market Design, Reputation Systems, UX, and the Cost of User Time*

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# What Matters in MD is a Matter of Perspective

*A friendly caricature:*

Economics department: MD is about efficiency

Business school: MD is about optimality

CS department: MD is about competitive ratio

Practice: MD is about keeping frictions (transaction costs) low

MD leave outside the picture: UX and Reputation Systems

# Reputation and Market Design

- eBay-- reputation system is “separate” from the auction
  - Direct impact of reputation-- bad scores lower willingness to pay
  - Indirect effect-- bad scores reduce the number of users who see the listing
- Uber, Lyft-- there are no indications that reputation is part of the “mechanism”
  - In theory users can decline matches based on reputation
  - In practice it appears that reputation is merely a filter
  - Could/should reputation be part of matching and pricing (e.g. higher prices for passengers with poor scores and lower prices for drivers with poor scores)?

*IMO: Whatever creates a need for a reputation system should be modeled as part of the environment and the reputation system should emerge endogenously as part of an (efficient) mechanism*

# What Is Wrong With This Picture?



Sony

Sony CMTSBT100 Micro Music System with Bluetooth and NFC



332 customer reviews | 426 answered questions

Price: \$198.00 ✓ Prime

In Stock.

Want it tomorrow, May 4? Order within **43 mins** and choose **One-Day Shipping** at checkout. [Details](#)

Ships from and sold by Amazon.com. Gift-wrap available.

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✎ [Four reasons to buy professional services on Amazon](#)

- Powerful, dynamic sound with classic design
- Bluetooth audio streaming3 with AAC and apt-X support
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**Does it cost anything to Amazon to ask users if they want “expert setup +\$179?”**

Roll over image to zoom in

## UX meets MD

Does it cost anything to Amazon to ask users if they want “expert setup +\$179”?

- Some shoppers will be deterred from buying the stereo because they will (incorrectly) infer from the question that installation is difficult
  - A seemingly innocuous question may lead to inefficient allocation!
- Amazon spent enormous resources building reputation of a store that offers best prices. This enables Amazon shoppers to save on search cost because expected savings from comparison shopping are negligible. Does offering overpriced installation damages this hard earned reputation?
- Dismissing an offer entails a cognitive cost
- The above costs need to be traded off against benefits from offering the service

Reporting the “type” is not free

Reading questions changes information sets

# Incorporating cost of “asking questions” into MD

- Early successes of MD (e.g. spectrum auctions) involved massive transactions where it was ok to assume away “cost of asking questions”
- Potentially enormous markets may consist of small transactions.
- Successful application of MD to markets with small transactions requires giving careful thought to “cognitive costs” and other transaction costs.
- A “big example” of a potentially enormous market that is currently small due to transaction costs is a market for carpool

# One driver, one rider, one less car on the road

Waze Carpool is an easy way for everyone to:



**Help each other out**



**Spend less money  
on commute costs**



**Make the most of a  
drive that's  
happening anyway**



**Support a greener  
commute with fewer  
cars on the roads**

## Spoiler Alert

- Prediction: In the future, fewer and fewer of us will travel in a solo metal capsule that weighs 2000% more than a human
- We will not become a nation of buses and trains
- Two to five people going in the same direction will share rides driven by one of the carpoolers until software takes over
- Getting 15% of people to carpool will:
  - virtually eliminate traffic
  - reduce pollution by more than 15%
  - reduce the number of totaled cars by around 15%
  - save those who carpool more than 50% on transportation
  - create several times the value of all oil fields of kuwait!



# Carpooling vs TNC

- The word “rideshare” came to mean TNC
- In terms of public policy and economics there is a world of difference between carpool and TNC
- Carpool -- activity where passenger(s) contribute an amount that is lower than the cost of gas and depreciation
- By definition, carpooling is non-commercial activity because making money is mathematically impossible

# Carpooling vs TNC (cont)

	Carpooling	TNC (Rideshare)
Traffic Congestion	Reduces	Usually increases
Pollution	Reduces	Usually increases
Cost relative to driving	Much Less	Much More
Most attractive for	Long commutes and intercity trips	Short city trips
Market size	Currently very small	Uber is valued at 50B+
Who are the target passengers	Everybody, especially lower middle class	Upper middle class and above

## Social Benefits Of Carpooling Are Recognized By Policy Makers



# Carpooling Never Became Form of Public Transit. Why:

- Time overhead of finding matches was too high
- Must count time of rideshare users who did not give/get a rides
- The cost of detours was high (hard to find directions)
- The communication/coordination cost was too high
- There were legitimate safety concerns
- Was too hard to weed out bad apples (no reputation mechanism)

# Old school carpooling

- Stable carpool pairs (for carpool to work)
  - “Infinitely repeated game” does not require formal reputation mechanism
  - Low time overhead
  - But: inefficient matching and lack of flexibility
- Casual carpool
  - Point to point casual nature makes it “impossible to be late”
  - But: inefficient matching
- Intercity one off trips
  - The longer the distance the smaller is inefficiency of matches

# What Does Carpooling Platform Must Do?

- Each user derives some value from the platform (need not be positive)
- Objective function: maximize the sum of values derived by each agent
  - Subject to constraint: expected benefit is not negative for all agents

# Passive vs Active Reputation Systems

- Active reputation system-- provides actionable information to economic agents
- Passive reputation system-- directly penalizes bad actors-- agents do not need to pay attention to the reputation of the trading partners
- Some “passive” reputation systems are in disguised as “active”
  - Amazon reputation system is mostly passive
  - Ebay reputation system is a hybrid-- some punishment from bad behavior comes from actions of other users some are from the platform. Losing pageviews is what really matters
  - Uber star system provides users with information but Uber drivers typically do not pay attention to passenger's reputation and vice versa. The consequences come from the platform.
- Active reputation systems leads to higher than necessary transaction costs
- Active reputation systems may lead to very inefficient penalties

# Karmic Justice Reputation System

If a buyer reports suffering harm  $x$  from seller's opportunistic actions subtract  $x$  from that seller's next period revenues and divide the subsidy  $x$  among future trading partners of the offending seller (excluding the injured buyer because giving a refund to the injured buyer would reward false accusations).



# Simple Model

- Let  $b(j)$  denote the (gross) benefit that a passenger  $j$  derives from a ride
  - Rider's net benefit is  $b(j)-p$  where  $p$  is the price of a ride
- Receiving notification with ride requests is costly to drivers,  $d$  is the cost
- Let  $c(i,j)$  denote the cost to the driver of giving a ride to passenger  $j$ 
  - Driver cost depends on detour time and other factors
  - Driver's net benefit: payments less driver's cost less notification costs
- $\text{Prob}(i,j)$  probability that driver  $i$  is available to give a ride to passenger  $j$  (when offered more than driver's cost).
- Assume that drivers accept ride requests instantly or not at all (enough time to send notifications to all relevant drivers).

# Two Strategies for Ranking Potential Drivers

Strategy 1. Rank drivers based on  $(b-c(i,j)-d)*\text{Prob}(i,j)$

Strategy 2. Rank drivers based on  $b-c(i,j)-d/\text{Prob}(i,j)$

- Question: What strategy will lead to higher social surplus?
  - Assume that the probability that a driver gets request from multiple passengers is negligible and that there is enough time to notify all relevant drivers.

*Cognitive costs should be modeled as part of the environment and (some) UX choices should emerge endogenously as part of an (efficient) mechanism*

# Conclusion

- Whatever creates a need for a reputation system should be modeled as part of the environment and the reputation system should emerge endogenously as part of an (efficient) mechanism
- Cognitive costs should be modeled as part of the environment and (some) UX choices should emerge endogenously as part of an (efficient) mechanism

*It is a good time to study market design-- there is a lot of important work ahead both in theory and in practice.*

Thank You