Transport Economics

Lecture 6

30 January 2023

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Homework 4.1 graded

In the presence of negative externality, govt imposes a uniform sales tax. Which service to tax? To minimize DWL? To maximize govt revenue?

Note: DWL comes from the external cost, not the tax. Tax is meant to "internalize" the externality.



Homework 4.2

Identify a transport market that is **one** of the following:

- Publicly owned, privately operated
- Privately owned, publicly operated
- Privately owned, mostly unregulated

Explain why such a structure is suitable for this particular market setting.

Homework 4.2: Publicly owned, privately run

- London Underground (Truong Tuan Dat)
- TransMilenio, Bogotá (Carlos Arturo Leon Acevedo)
- HSL (laroslav Kriuchkov)
- Government built and owns the network, private firms are employed via competitive contracts to provide the vehicles and handle operation
- Rationale: Private sector can operate cost-effectively, government can dictate fares and service levels/quality to internalize externalities.

Homework 4.2: Privately owned, publicly run

New York taxi market (Iaroslav Kriuchkov)

- Private owners of taxi vehicles
 - Competition with each other, costeffective investments in inputs
- Public oversight/regulation
 - New York City Taxi and Limousine Commission
 - Supply (licensing/"Medallions"), branding, setting fares, service quality, ...



Photograph: Shutterstock, (timeout.com)

Homework 4.2: Mostly unregulated private ownership

Monte Toboggan Sledges, Funchal, Portugal (Niklas Astala)

- Popular 19th century mode for transporting wood and residents from the mountains of Madeira to the town downhill (one-way only).
- Today, mainly a tourist attraction
- Private monopoly by *Carreiros do Monte*
- Minimal public regulation: no helmets, seatbelts, safety oversight
- Likely because it doesn't serve the local public, small niche market, and no history of serious accidents.



A group of people taking a Monte Toboggan Sledge. (Source: getyourguide.com)

Many informal/new/niche transport services around the world lack public oversight.

• e.g. Boda-bodas (motorcycle taxis) in Kampala, Uganda (laroslav Kriuchkov) are mostly self-regulated.

Price Discrimination (review)

- Sell the same service to different buyers at different prices
 - e.g., student discounts, lower off peak fares, etc.
- Can sell more quantities than at one price.
- Perfect price discrimination: no deadweight loss.
 - But zero consumer surplus
- Requires: market power, market separability, low admin costs, different price elasticities of demand



Price



Pricing examples

- Taxis/ridesharing services
 - Dynamic price discrimination
 - also discriminating on costs e.g., driver compensations
- Road travel
 - HOV lanes, toll roads
 - Congestion pricing

Inefficiencies in taxi markets

- Demand for taxi rides varies over time and space
 - As a taxi driver, where do you cruise for customers? When is the time better spent doing some other job instead?
- Supply of taxi rides varies over time and space
- One taxi fare won't do. Need price discrimination.
- But riders and drivers have imperfect information on taxi supply and demand.



Real-time pricing in ride hailing markets

- More efficient at clearing any excess demand or supply across time and space
- Ridesharing platforms not necessarily maximizing supplier profits (like private monopolists), or consumer surplus, or net social benefits.
- Say, maximizing # of rides (or long term market share):
 - Can match low-cost drivers to low-value riders at low prices
 - Can match high-cost drivers to high-value riders at high prices
 - Surplus?
- Who benefits from real-time pricing? Active area of research.

Markets for cars vs road space

- Road space
 - is fixed (in the short run): vertical supply curve
 - demand is complementary to demand for private cars



- Price of road space fixed at 0
 - But demand meets supply at a lower quantity
 - \rightarrow Excess Demand / congestion
- Excess demand in road space arises from externality in market for private cars

1. Increase supply of road space

- Eliminates excess demand (in the short run)
- But also makes driving more attractive!
- \rightarrow Increases demand for private cars (at any given price)
- →More cars on the road induces higher demand for road space.
- \rightarrow Congestion persists in the long run!



Fundamental Law of Road Congestion

- Downs, A. (1962). "The law of peak-hour expressway congestion", *Traffic Quarterly*, 16(3): 393–409.
- Duranton, G. and Turner, M. (2011). "The Fundamental Law of Road Congestion: Evidence from US cities". American Economic Review, 101(6): 2616-52.



- 2. Tax cars/driving
- to internalize the externality
- Taxing car manufacturers increases the price of cars and reduces car ownership.
- Fewer cars on the road eases demand for road space and congestion.
- Alternatively, can reduce demand for car ownership by making driving costlier
 - E.g. fuel taxes, costly parking, etc.



3. Price roads

- Demand for road space varies over time and space.
- Can we (price) discriminate?
 - Instead of taxing cars, directly price roads
 - To shift travelers from peak hours to off-peak hours
- May also price discriminate across space (e.g., more central parts of cities), by road usage, etc.
 - Congestion tax/charge
 - HOV lanes / toll roads



Congestion pricing

- e.g., in London, Singapore, Stockholm, Milan, ...
- Long popular among economists, widely unpopular among policy makers!
- William Vickrey ("father of congestion pricing"):
 - "You're not reducing traffic flow, you're increasing it, because traffic is spread more evenly over time."
 - "People see it as a tax increase, which I think is a gut reaction. When motorists' time is considered, it's really a savings."
- Implementation raises equity issues: winners vs losers? how much to price?

Congestion externality in the market for travel

- Travelers are both demanders and suppliers
- Price = inverse travel speed (1/S)
- Quantity = travel volume (V)
- Average traveler faces the Average Cost
 - i.e., the supplier's private cost of producing an additional unit travel
- The cost their travel imposes on everyone's travel is the Marginal Cost



The DWL from congestion

- Equilibrium volume of travel V^{eq} where private cost C equals private benefits D.
- Socially optimal volume of travel V^{opt} where social cost MC equals benefits D.
- More travel in equilibrium than is optimal: DWL in gray
- A congestion tax can shift C towards MC and make travelers internalize the externality.



How large should a congestion tax be?

- Depends on price elasticities of demand and cost curves!
- Kreindler, G. (2022). "Peak-Hour Road Congestion Pricing: Experimental Evidence and Equilibrium Implications". Working paper.



No "free" Lunch

- We can control some prices (e.g., monetary), but costs may get passed down
 - in other forms e.g. travel times
 - to other markets e.g. as externalities
- E.g. what is the real price of public transit travel?
 - Fares
 - Travel times, wait times, crowdedness, ...
 - Proximity to transit station, housing prices, ...
 - Road space \rightarrow costs of using other modes, ...
 - Opportunity cost of government spending on public transit
 - ...
- How do these costs of public transit vary across urban residents?

Today's "worksheet" problem

Mid-period feedback survey

- Help me improve the class!
- Respondents are anonymous to me.

So, how do I evaluate this worksheet?

- If at least 50% of you complete the survey, everyone gets 1 / 2.
- If at least 75% of you complete the survey, everyone gets 2 / 2.
- If 95%-100% of you complete the survey, everyone gets 3 / 2.
 - If more than 100% complete survey, everyone gets 1/2.

Deadline: before next lecture on Feb 2

Mid-period feedback survey

https://link.webropol.com/s/ tecon-midsurvey



Housing markets

 Housing is immobile (mostly), so housing prices may reflect demand for other location-specific amenities

- e.g. a new subway station may increase demand for housing in the neighborhood
- Unintended price discrimination!
 - the real price of accessing transit services may vary across space



Housing prices near transit stops (New York)



Housing prices are higher near mass transit stops.

Public transit ridership (commutes in US cities)



Low-income commuters ride bus more.

High-income commuters ride subway/rail more.

Public transit ridership by neighborhood (US cities)



 ...because subway/rail are closer to high-income neighborhoods

One possible explanation:

- Higher-income households outbid low-income households for proximity to rail transit (but not to bus transit).
- b/c bus transit is inferior good, but rail transit is normal good

Which travelers should public transit target?

- 1. Subsidized travel for those with few/poor alternatives?
 - Typically low-income
- 2. Or for those with high negative externalities (e.g., drivers of private vehicles)?
 - Typically high-income
- 3. Or for those with higher willingness/ability to pay?
- 4. Price discriminate to generate revenue from some riders and subsidize travel for others?

Homework Problem 6

To be assigned. Focus on debate prep for now.

Due: February 9 (Thursday)

Policy debates

In each scenario, you are either a proponent or an opponent of the proposal.

The debate is over the direction of public policy planning (setting aside the intricacies of actual implementation).

Debate topics (Thursday, Feb 2)

- 1. Should inter-city railway tracks be publicly owned?
 - Yes: lina Rusanen, Chris Yung, Veeti Kuivanen, Rosemarie Maya
 - No: Otto Tarnanen, An Duong, Florian Wiest*, Aku Staff
- 2. Should urban street parking spots be privately owned?
 - Yes: Antonio Fadel da Costa, Ilmari PyykköJani, Jani Järviluoto, Viola Väänänen
 - No: Lotta Keskinen, Sol Eun Park, Samuel Babjak, Riina Hiltula

Debate topics (Monday, Feb 6)

- 3. Should US cities invest more in expanding their bus transit network rather than their rail transit network?
 - Yes: Aino Lahnalampi, Niklas Astala, Yuxi Shen, Jenni Kujala
 - No: Carlos Arturo León Acevedo, Venla Moisio, Wenchan Zhao, Naomi Salama
- 4. Should Helsinki price discriminate on its City Bikes fares across time and space?
 - Yes: Dat Truong Tuan, Eemeli Ahvenniemi, Matias Säämäki, Joel Leppänen
 - No: Chen Xin, Maria Käpyvaara, Linda Autio, Iaroslav Kriuchkov*
- 5. Should prices of public transit season tickets be income-dependent?
 - No: Christopher Kane, Janne Kousa, Samu Hasegawa, Joona Aspegren
 - Yes: Antto Tukia, Laura Jaunäkä, Kalle Laukkanen, Valtteri Lammassaari

Debate structure

- 1. Proponents have 10 minutes to present their case first and are free to expand on the details of the original prompt as they see fit. They have 3-5 minutes to respond to questions from the audience.
- 2. Opponents have 10 minutes to present their case against the proposal. They have 3-5 to minutes to respond to questions from the audience.
- 3. Proponents have 5 minutes to respond to opponents' critique.
- 4. Opponents have 5 minutes to respond back.
- 5. Up to 5 minutes of flexible back-and-forth

When your turn to present, you may use other visual aids besides slides. You should take turns presenting and everyone in a group must present to get credit.

Worksheets 7 and 8: evaluate debate performance on others' topics.

Debate deliverables

1-2 page written policy outline

- Refining your stance on the debate topic
- Summarizing your main arguments

Upload to MyCourses by:

- 1 Feb 20:00 for debates 1 and 2
- 3 Feb 20:00 for debates 3, 4 and 5

Visible to everyone (including opposing team) the night before the debate.

Debate evaluation

Total: 20 points

- 5 points for policy outline
- 10 points for prepared presentation of your case.
- 4 points for rebuttals and responses to questions.
- 1 point for "winning" the debate (to be determined by everyone else in the class).

Grading criteria:

- Clarity of presentation and coherence of reasoning (40%)
- Incorporation of economic concepts from the course (40%)
- Use of empirical evidence to bolster arguments (20%)

Group assignments

- Should inter-city railway tracks be publicly owned?
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 - No: Otto Tarnanen, An Duong, Florian Wiest*, Aku Staff
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