Logistics

- Problem set
  - Due: **June 15**
  - Collaborative session (organized by Kimmo Palanne) on **25 May (Wed) 2-4 pm in V001**
- Presentations
  - on May 25 and 30 (see schedule on MyCourses)
  - aim for 15-20 min, and be ready for 5-10 min of questions

Lecture 10
Transportation

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ECON-L6000 - Urban and Regional Economics
Aalto University School of Business

Spring 2022

Today's Agenda

1. Transportation markets and externalities
   - policy solutions and evaluations
2. Implications for urban growth
   and distribution of activity within cities
3. Concluding remarks
   - and other interesting topics in urban economics

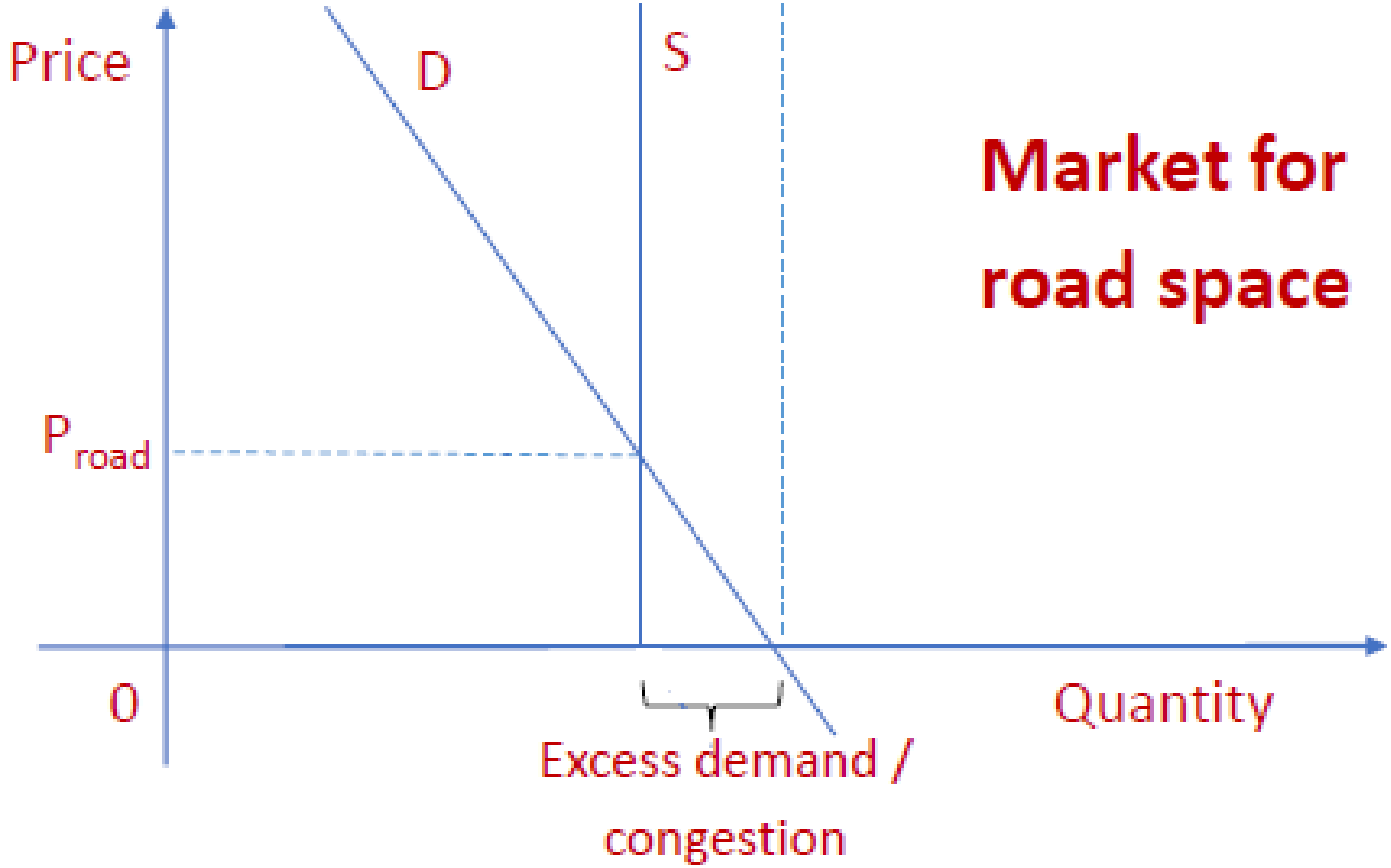
Public good problem

Transportation infrastructure is typically publicly provided.

Old problem: how much to provide? and where to allocate? (in the absence of market pricing)

- Hard to gauge private demand
- Hard to quantify externalities

Market for road space

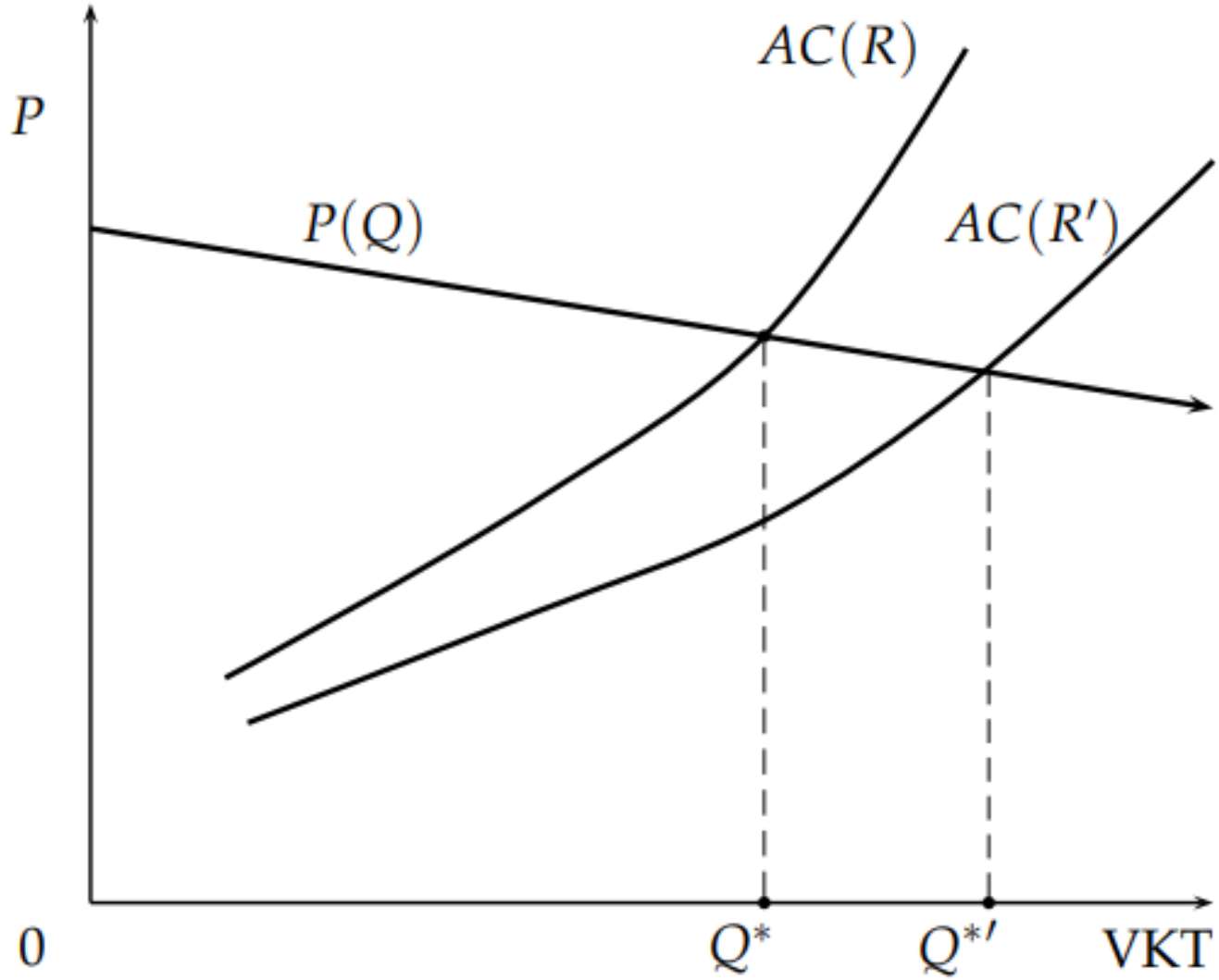


Policy option 1: Expand road supply

Problem: "Fundamental law of highway congestion" (*Downs 1962, 1992*)

- New road capacity induces proportional increase in demand for driving!

Policy option 1: Expand road supply



from *Duranton and Turner (2011)*

Policy option 1: Expand road supply

Straightforward in theory. How to test empirically?

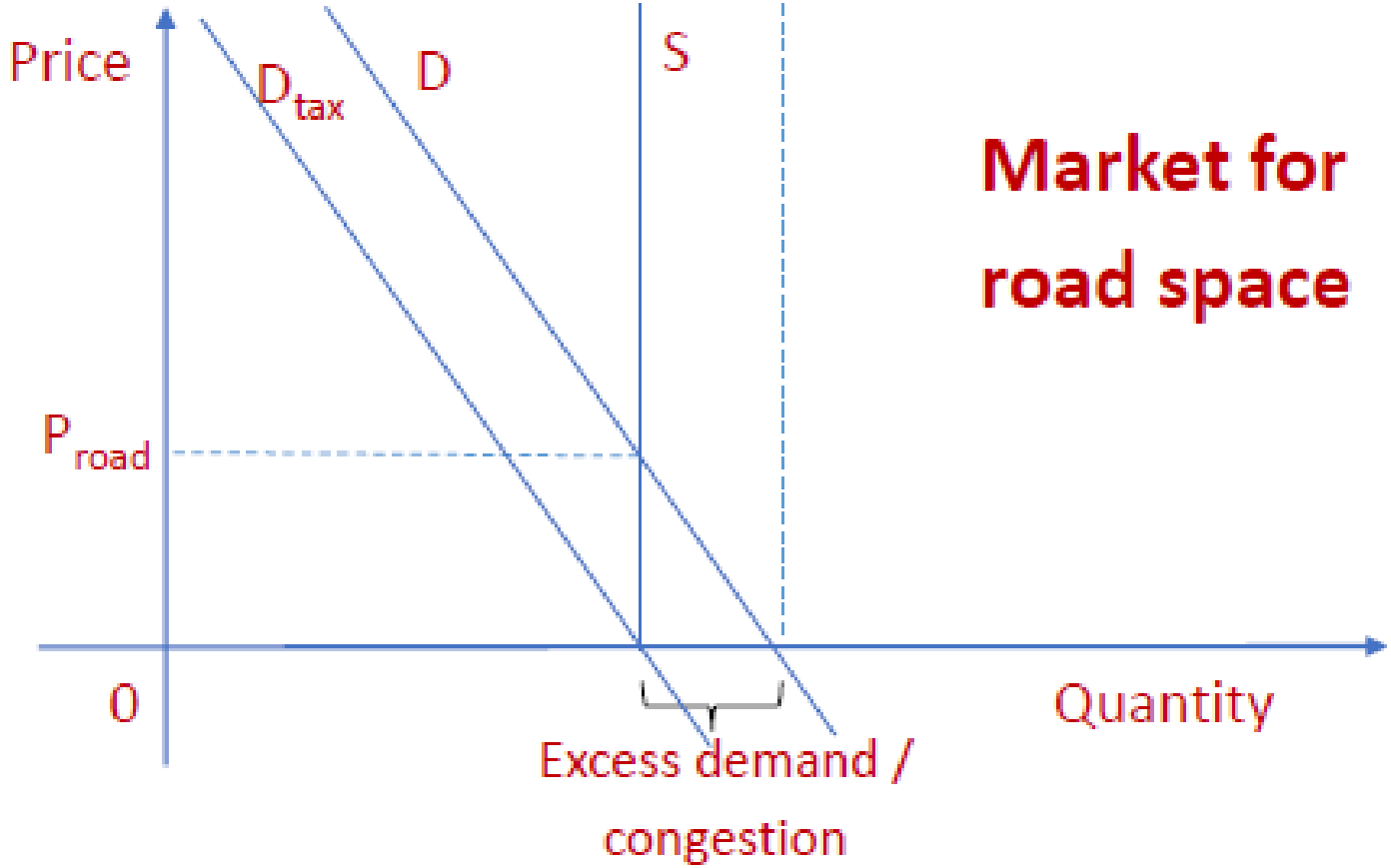
- Simultaneity of demand and supply
  - road expansions cater to demand as well as induce new demand
- Spillovers across routes
  - e.g., traffic might increase on expanded routes but decrease elsewhere

Policy option 1: Expand road supply

Duranton and Turner (AER 2011): Effect of additional road space on road travel in the US?

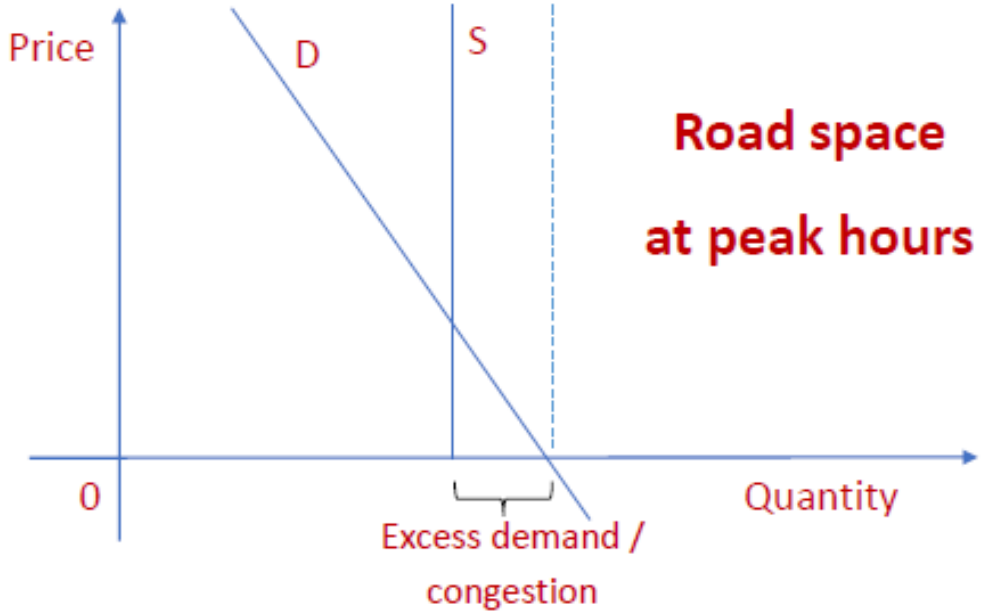
- Study entire highway network within metropolitan areas
  - instead of specific routes
- Instrument for road incidence using:
  - proposed routes in preliminary plan of interstate highways
  - rail routes in 1898
  - routes of major exploratory expeditions 1835-1850
- Estimate elasticity of highway VKT (per household per year) w.r.t. lane km: **1.03**

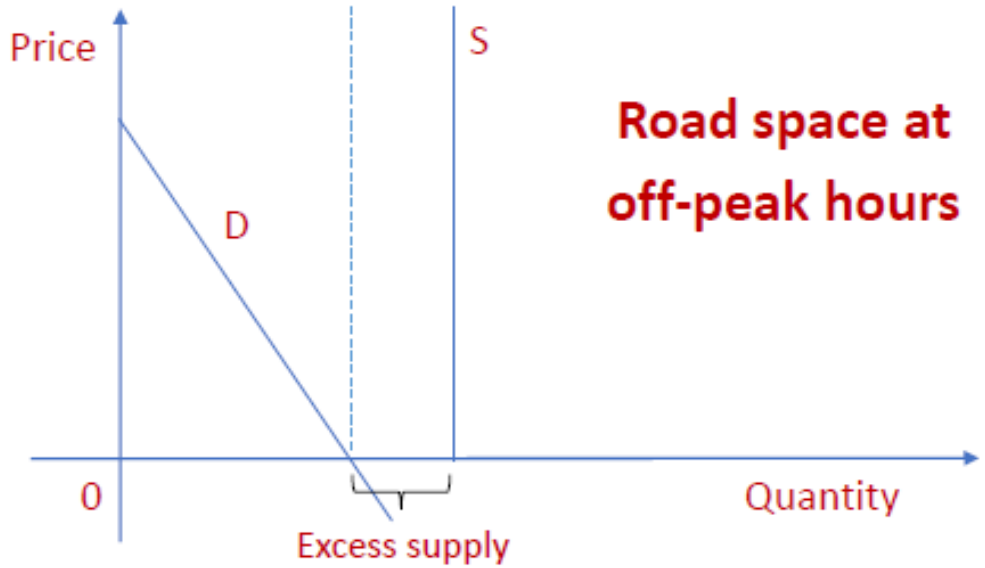
Policy option 2: Tax driving



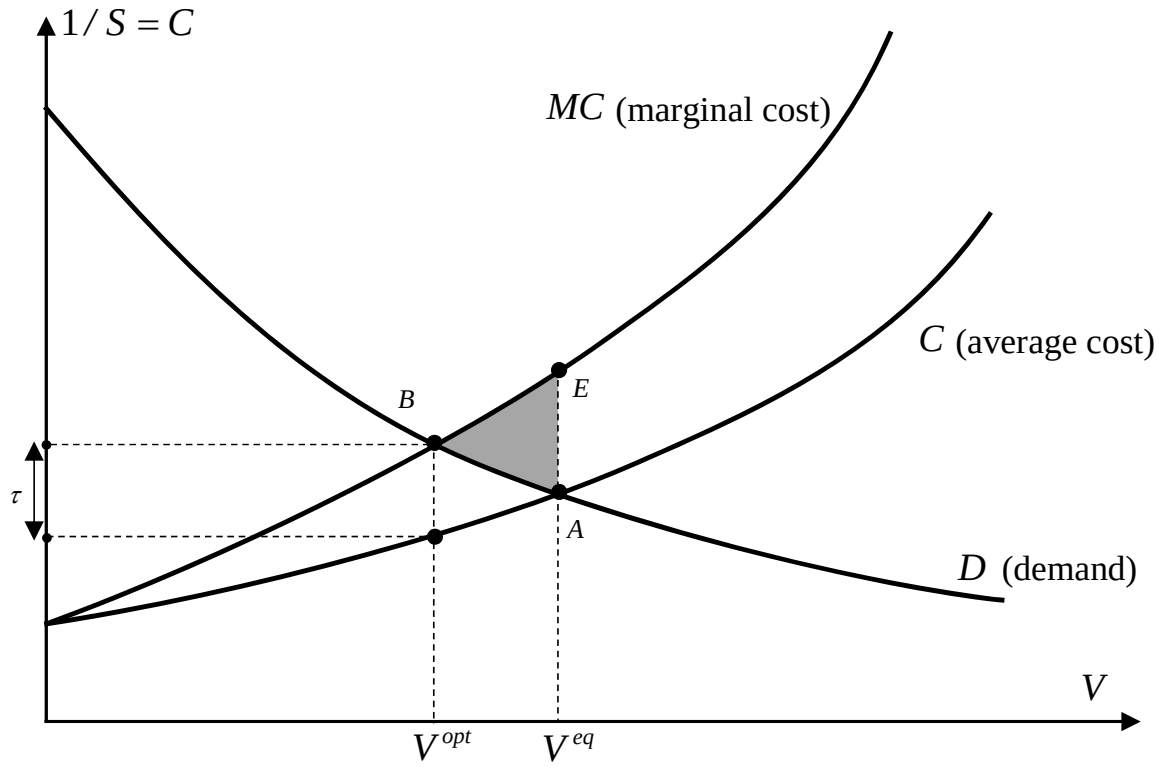
Market for road space

- Demand varies across time and space, but short-term supply isn't flexible.
- Need to price discriminate to re-distribute demand.





The congestion externality



- Market for road traffic: travelers are both demanders and suppliers
- Each traveler faces the **average cost**. The cost of them being on the road for everyone else is the **marginal cost**.
- More equilibrium travel than optimal (DWL in gray)

Policy option 3: Driving restrictions

High-occupancy vehicle (HOV) lanes

- if underused, could worsen traffic
- in Jakarta, professional passengers ("jockeys") stood by key road access points and provided an additional passenger for a small fee.
- can incorporate pricing directly e.g., High-occupancy toll (HOT) lanes

Hanna, Kreindler, and Olkein (Science 2017)

Jakarta's 3-in-1 policy: private cars must carry at least 3 during rush hours (7-10am, 4:30-7pm).

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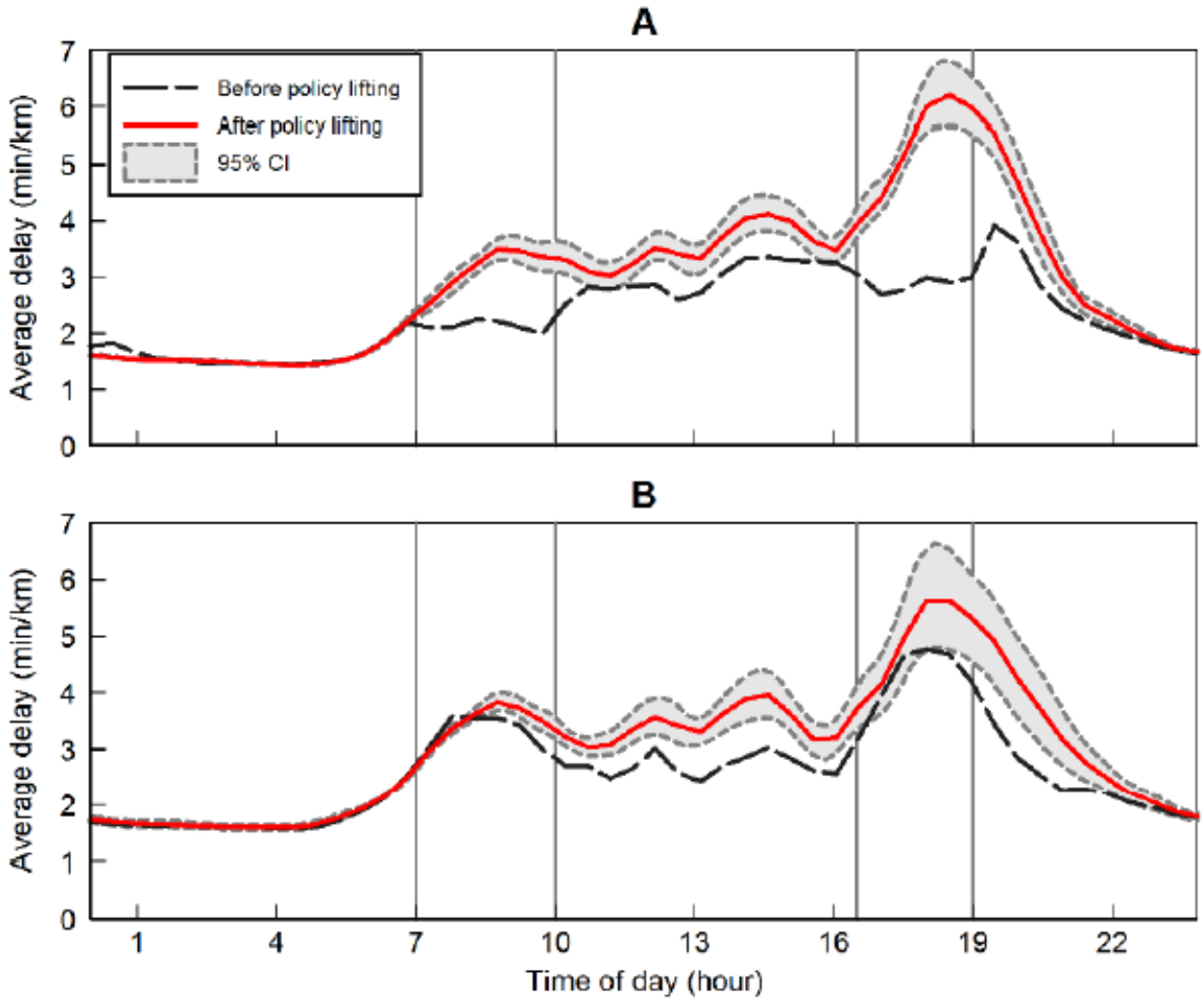

Policy option 3: Driving restrictions

Restrictions by license plates on different days

- to get drivers to gradually substitute to alternative travel modes
- e.g., in Mexico City in 1990 *(Davis 2008)*, Bogota, Sao Paolo, Santiago, Beijing, etc.

Gasoline sales *(Davis, JPE 2008)*

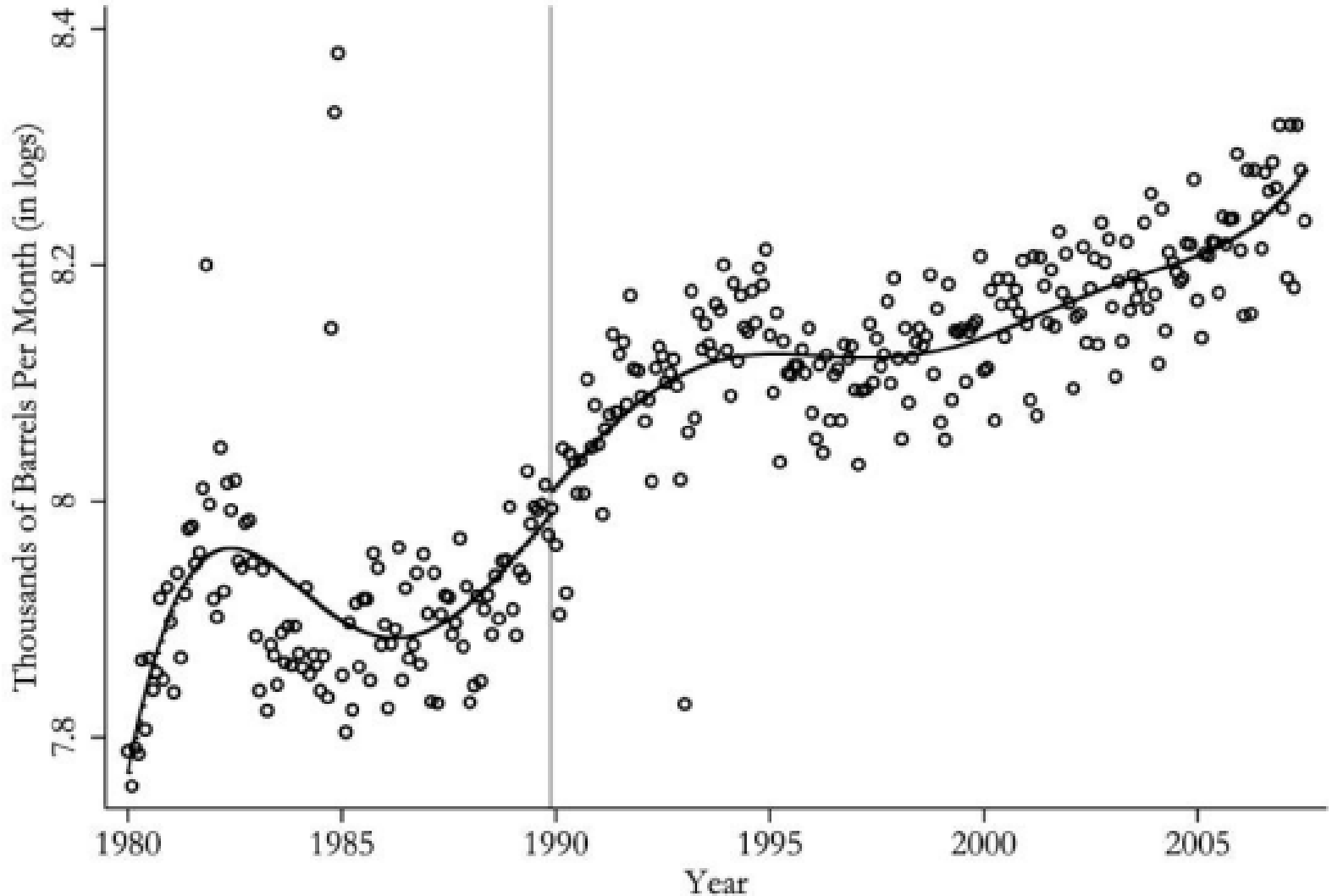

FIG. 6.—Gasoline sales in Mexico City, 1980–2007. Source: Gobierno de México, Secretaría de Energía, 2007.

Subway ridership *(Davis, JPE 2008)*

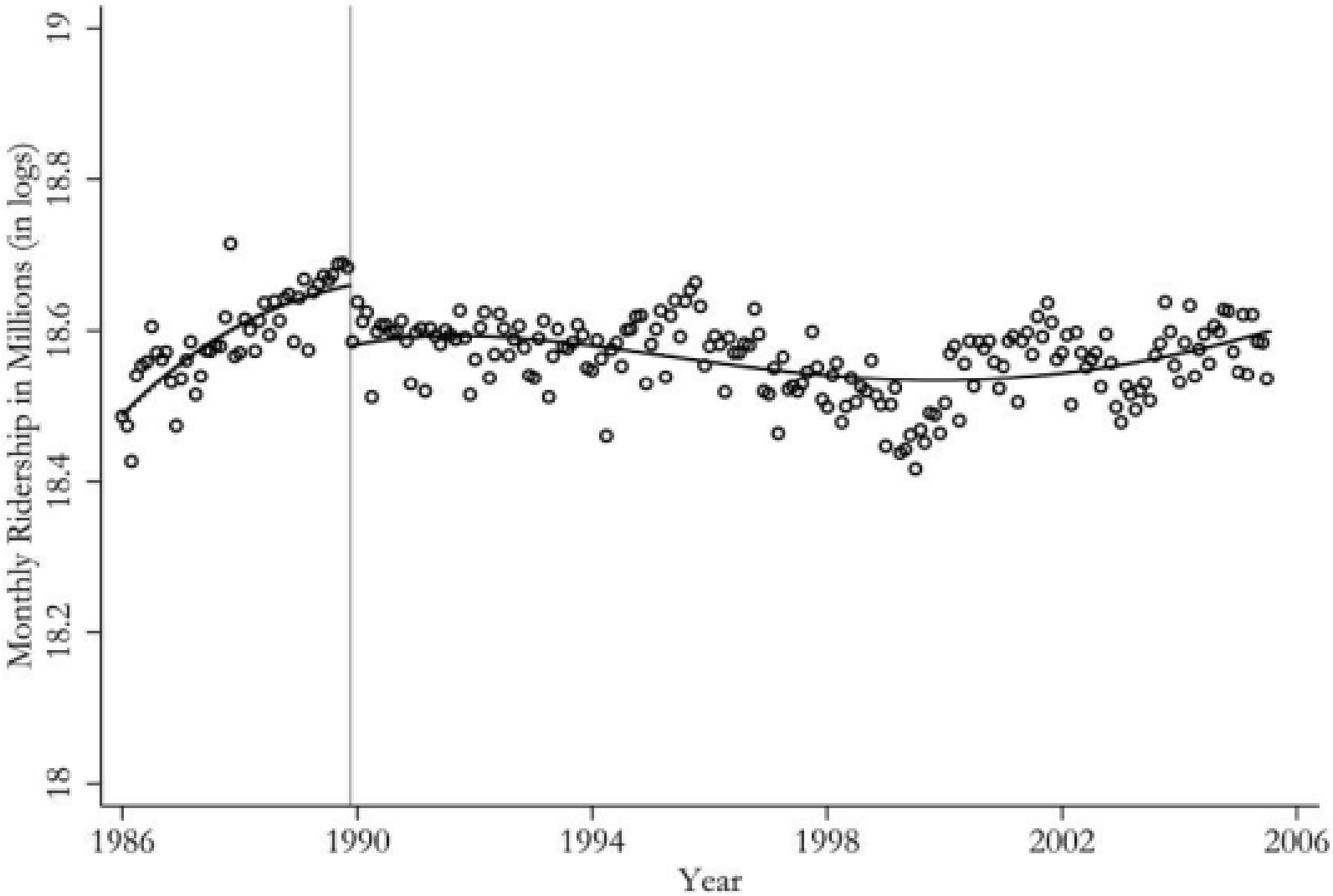

FIG. 7.—Subway ridership in Mexico City, 1986–2005. Source: INEGI, Gobierno del Distrito Federal, Sistema de Transporte Colectivo Metro, 2006.

Bus ridership *(Davis, JPE 2008)*

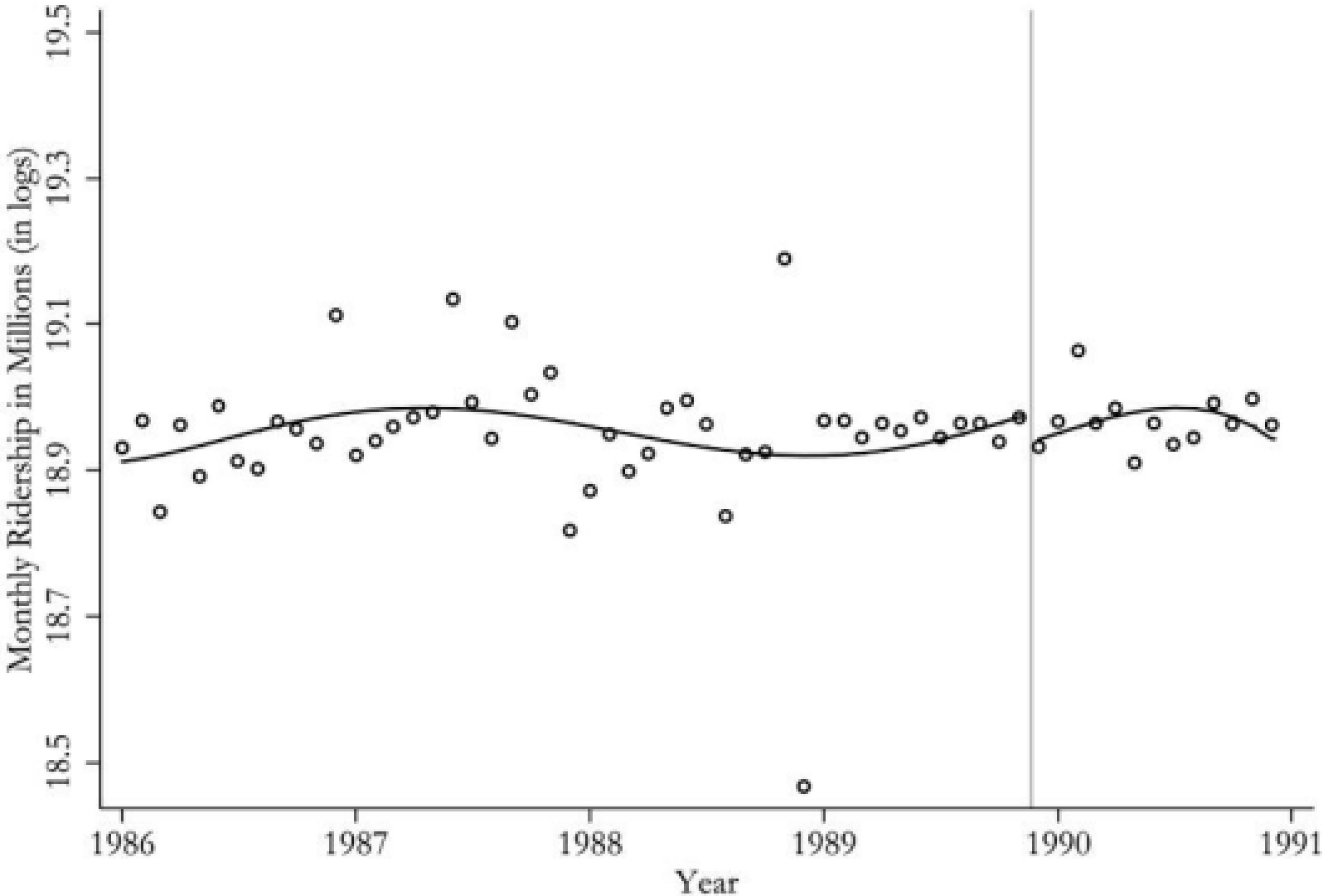

FIG. 8.—Public bus ridership in Mexico City, 1986–90. Source: INEGI, Gobierno del Distrito Federal, Red de Transporte de Pasajeros, 2006.

Taxis *(Davis, JPE 2008)*

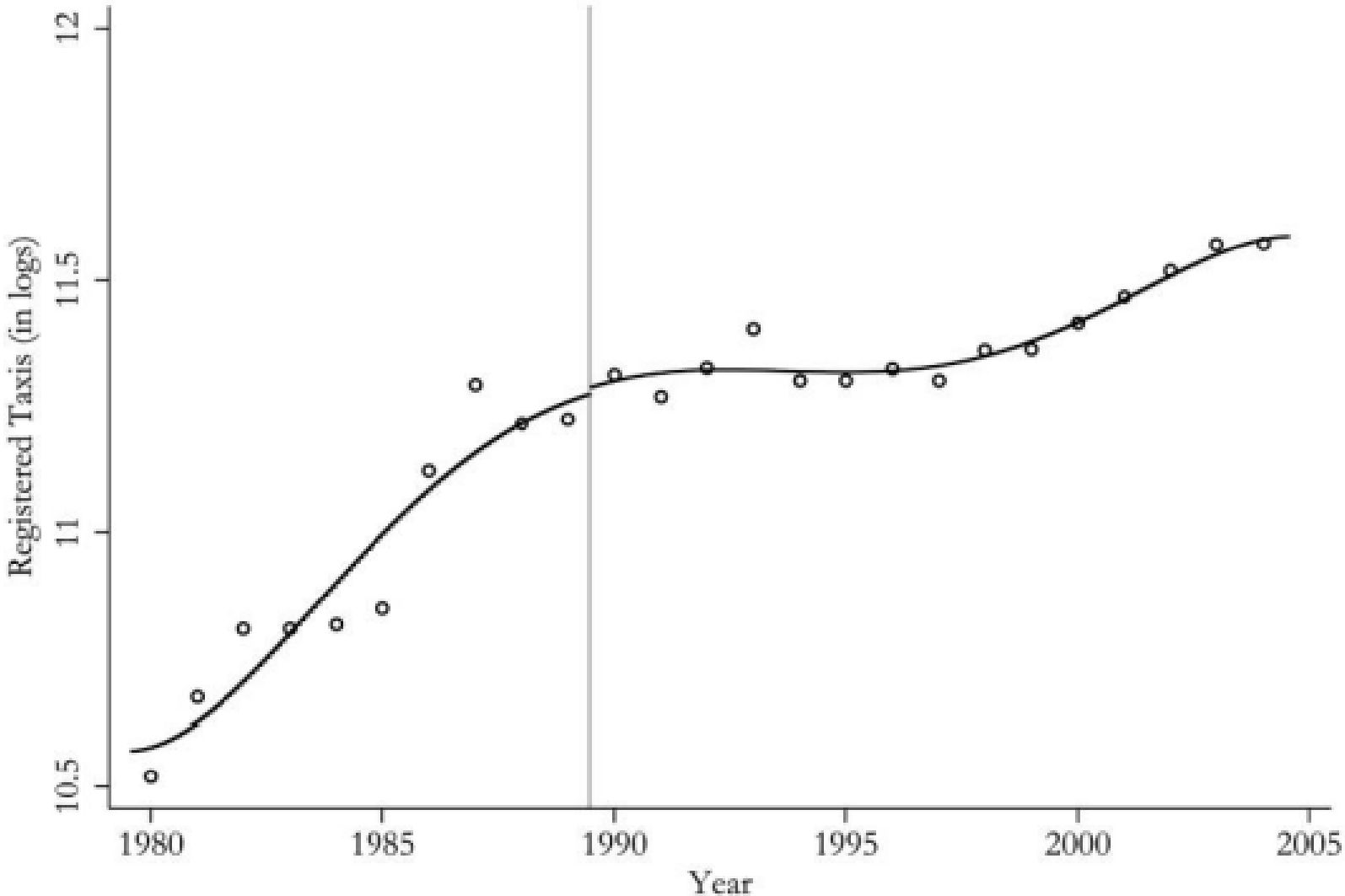

FIG. 11.—Taxis in Mexico City, 1980–2004. Source: INEGI, Estadísticas de Transportes, Vehículos de Motor Registrados en Circulación, 2007.

Taxi prices *(Davis, JPE 2008)*

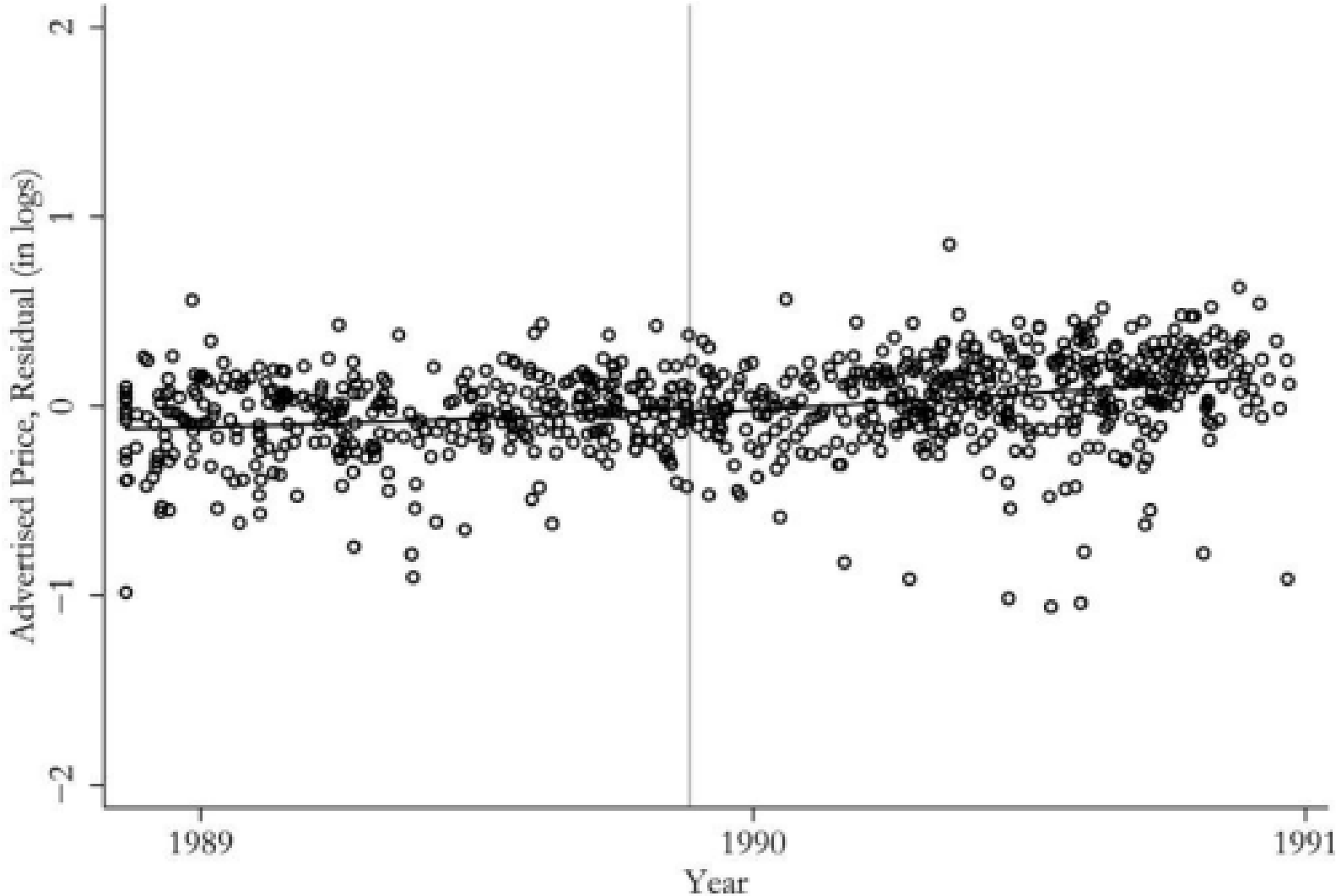

FIG. 12.—Taxi prices in Mexico City, 1988–90. Source: *El Universal*, Sunday vehicle section, November 1988–November 1990.

Registered vehicles *(Davis, JPE 2008)*

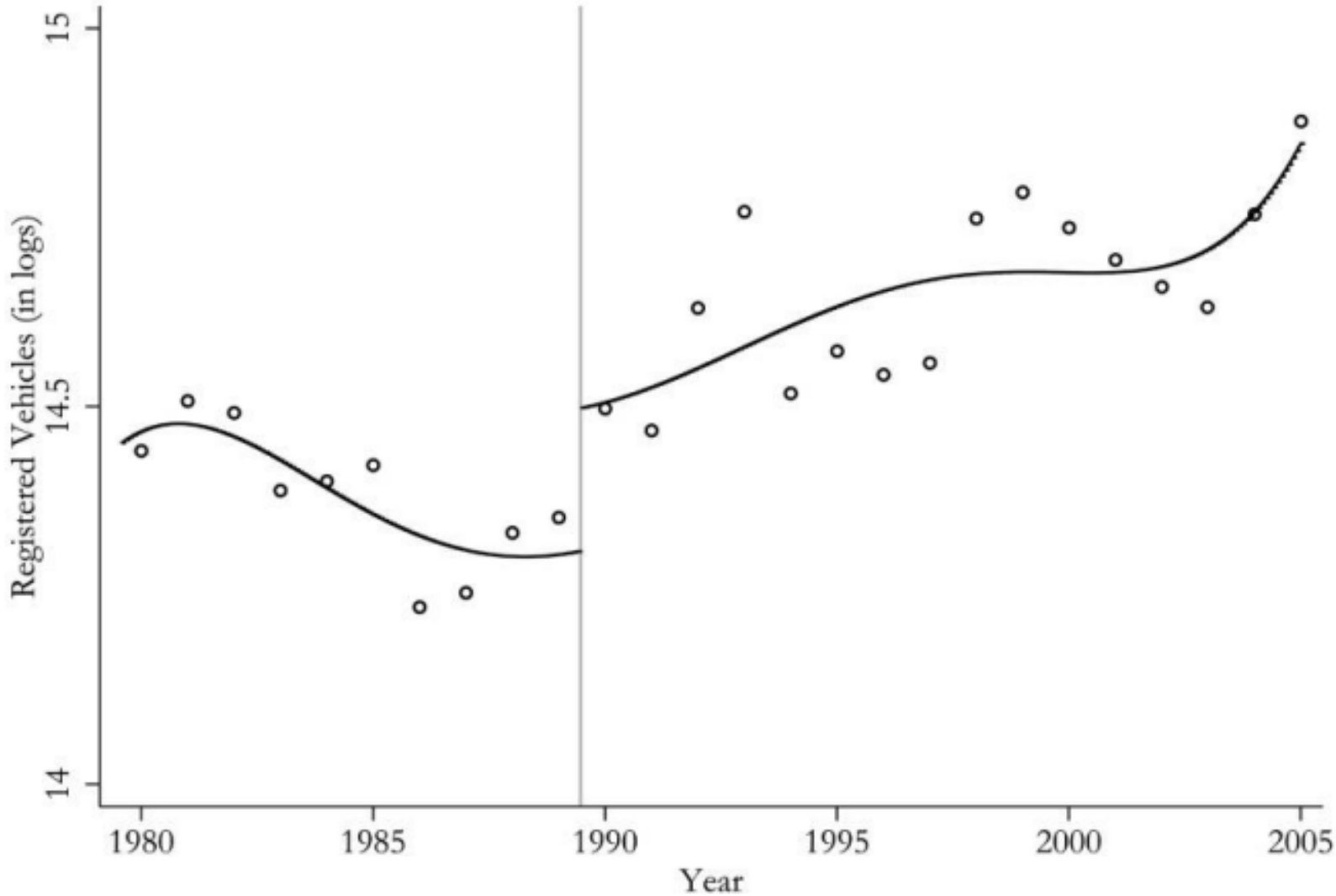

FIG. 9.—Registered vehicles in Mexico City, 1980–2005. Source: INEGI, Estadísticas de Transportes, Vehículos de Motor Registrados en Circulación, 2007.

Policy option 4: Public transportation

- New public transportation infrastructure is expensive. Yet, increasingly preferred choice of local governments.
- In the US, only 1-2% of travel miles via mass transit. Yet, transit subsidies are popular in large driving-heavy cities like Los Angeles.
  - In a 2008 referendum, 67% of LA county voted to allocate $26 billion to transit over 30 years
  - Why? if few voters are transit riders?

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  - In a 2008 referendum, 67% of LA county voted to allocate $26 billion to transit over 30 years
  - Why? if few voters are transit riders?
- Public transit relieves congestion, so benefits drivers too?
  - But only moving a small fraction of drivers off the street!

Anderson (AER 2014)

Hypothesis:

- Commuters on different roads and times face different levels of congestion.
- Transit attracts commuters who face the worst congestion, who would otherwise drive on the most congested roads at the most congested times.
- Drivers on heavily congested roads have a much higher marginal effect on congestion.
- So, transit has a large impact on reducing congestion.

Anderson (AER 2014)

By how much does Los Angeles' public transit relieve congestion?

- Natural experiment: on Oct 2003, LA public transit workers went on strike for 35 days shutting down bus and rail lines
- Look at effect on hourly traffic speeds on major freeways

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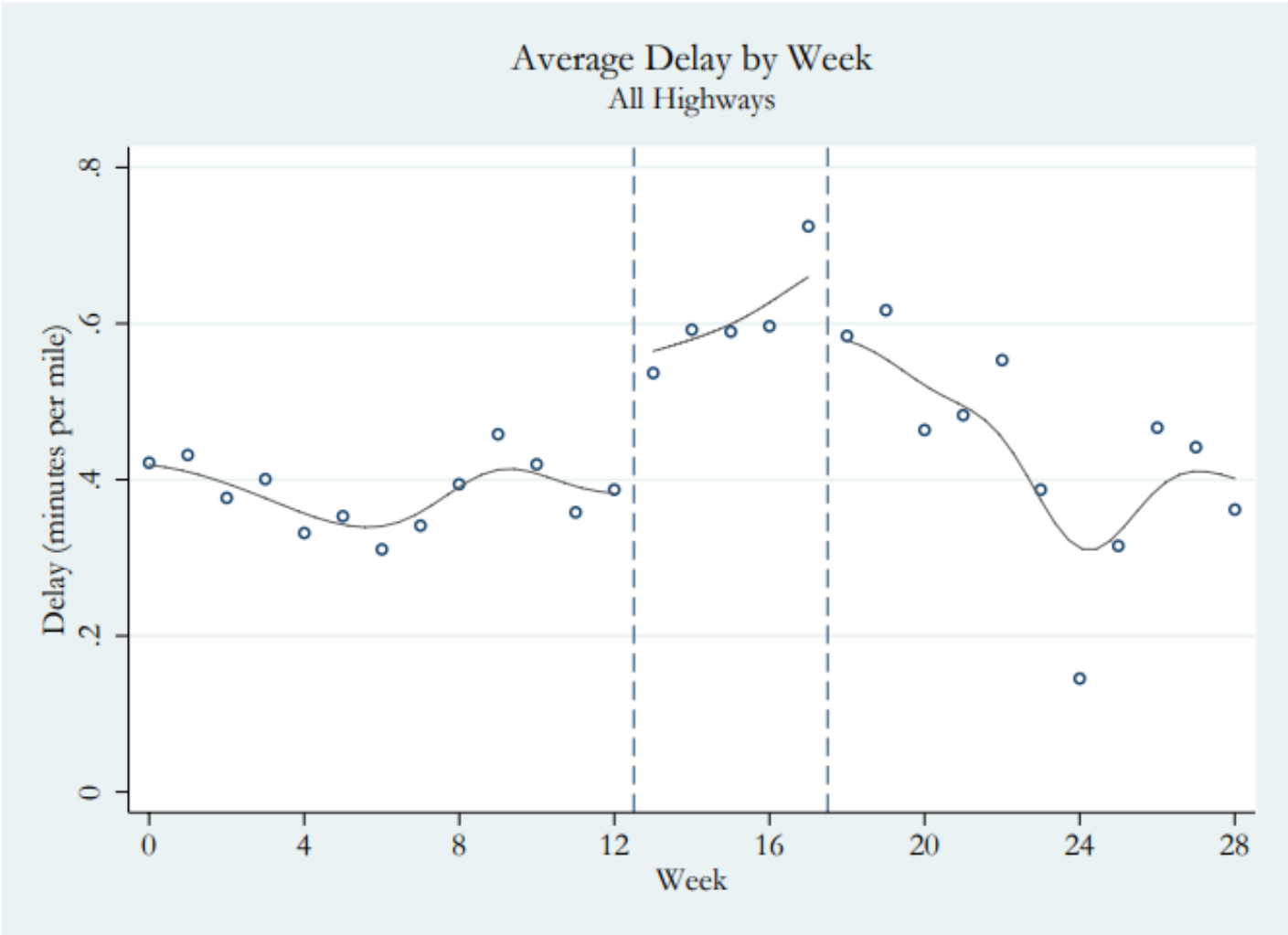
- Natural experiment: on Oct 2003, LA public transit workers went on strike for 35 days shutting down bus and rail lines
- Look at effect on hourly traffic speeds on major freeways
- Find: increase in avg travel delays of 47% during peak hours
  - Larger effect on freeways that parallel popular transit routes

Anderson (AER 2014)

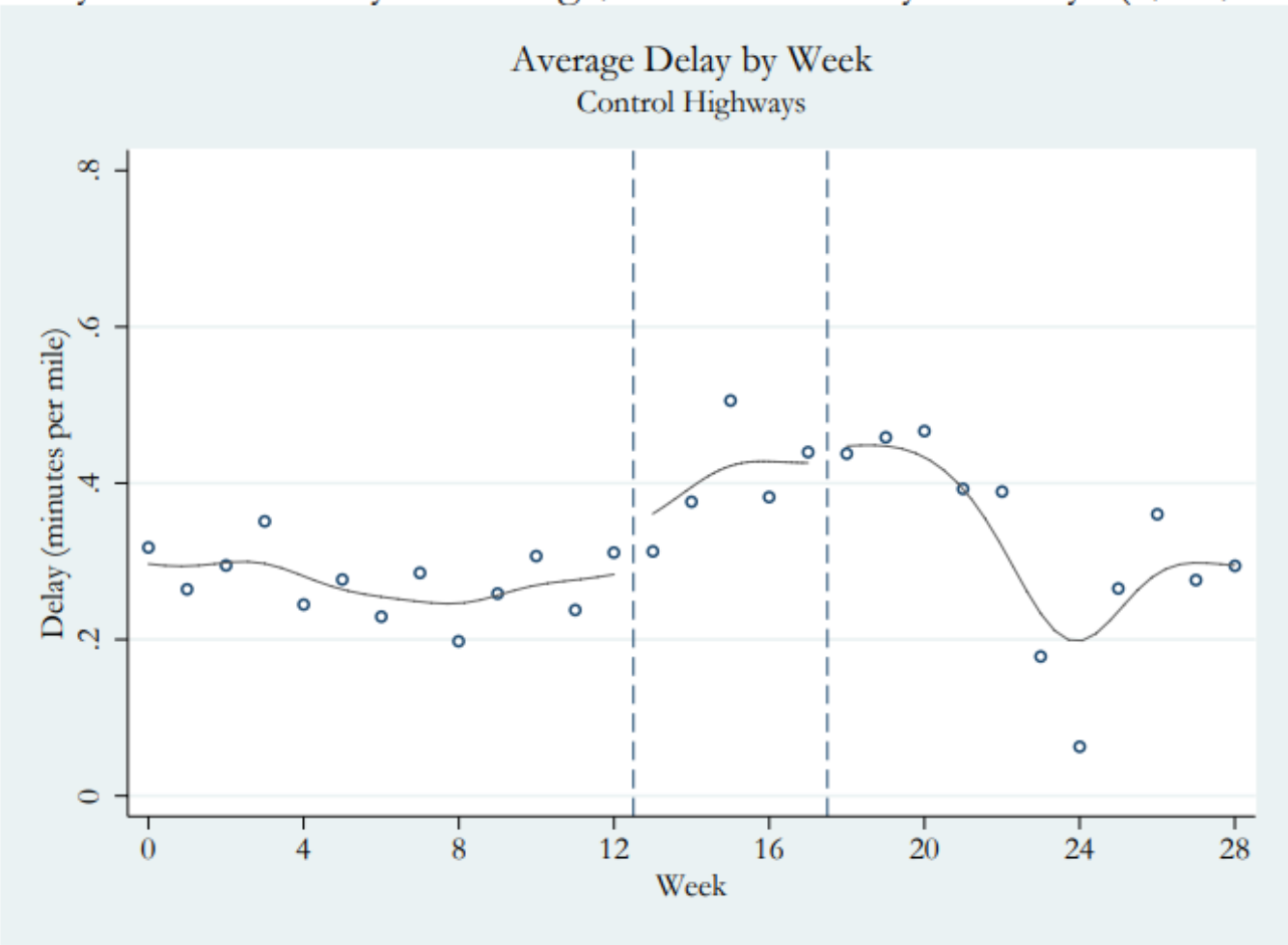
Figure 2: Weekly Peak Hr. Delay on Major L.A. Freeways (7/14/03–1/30/04)



Anderson (AER 2014)

Neighboring counties were unaffected.

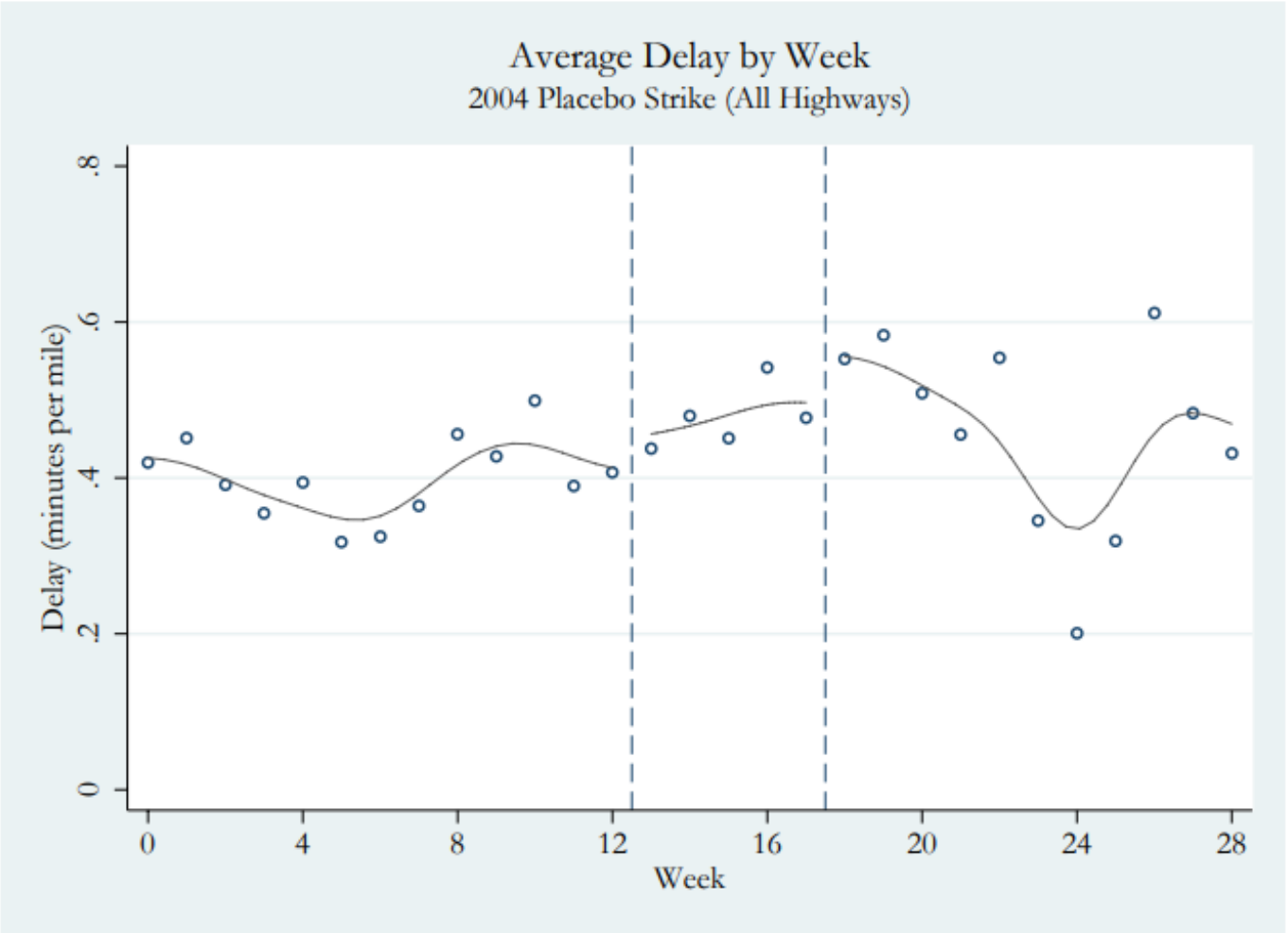
Weekly Peak Hr. Delay on Orange/Ventura County Freeways (7/14/03–1/30/04)



Anderson (AER 2014)

Delay is not a seasonal effect.

Weekly Peak Hr. Delay on Major L.A. Freeways 1 Year Later (7/14/04–1/30/05)



Policy option 4: Public transportation

In the long-run, other margins of adjustment possible besides mode choice that affect welfare e.g.:

- how much to travel
  - fundamental law of congestion
- commutes (where to live and work)
- land and property values
  - e.g., *Gupta et al. (2020)*
- population decentralization
  - e.g., *Gonzalez-Navarro and Turner (2018)*
- air pollution
  - e.g., *Gendron-Carrier et al. (2020)*
- long-term growth
  - e.g., *Heblich et al. (2020)*

Policy option 4: Public transportation

- *Tsivanidis (2022)*: direct travel time gains only account for 60-80% of the total general equilibrium gains from expanding a BRT system in Bogota

- *Anderson (2014)*: travel time gains from LA Metro Rail well above its costs
  - extrapolating short-term gains based on natural experiment

- *Severen (2021)*: benefits from Metro Rail are only 12-25% of annual costs
  - QSE framework accounting for commuting patterns, housing supply, local productivity and amenities, etc.

Policy option 5: Congestion pricing

To deal with negative externalities of driving, just price road usage!

- e.g., in London, Singapore, etc.
- can price discriminate across space, by road usage, time of day, etc.
- long popular among economists, widely unpopular among policy makers!
- Equity issues, and how much to price?

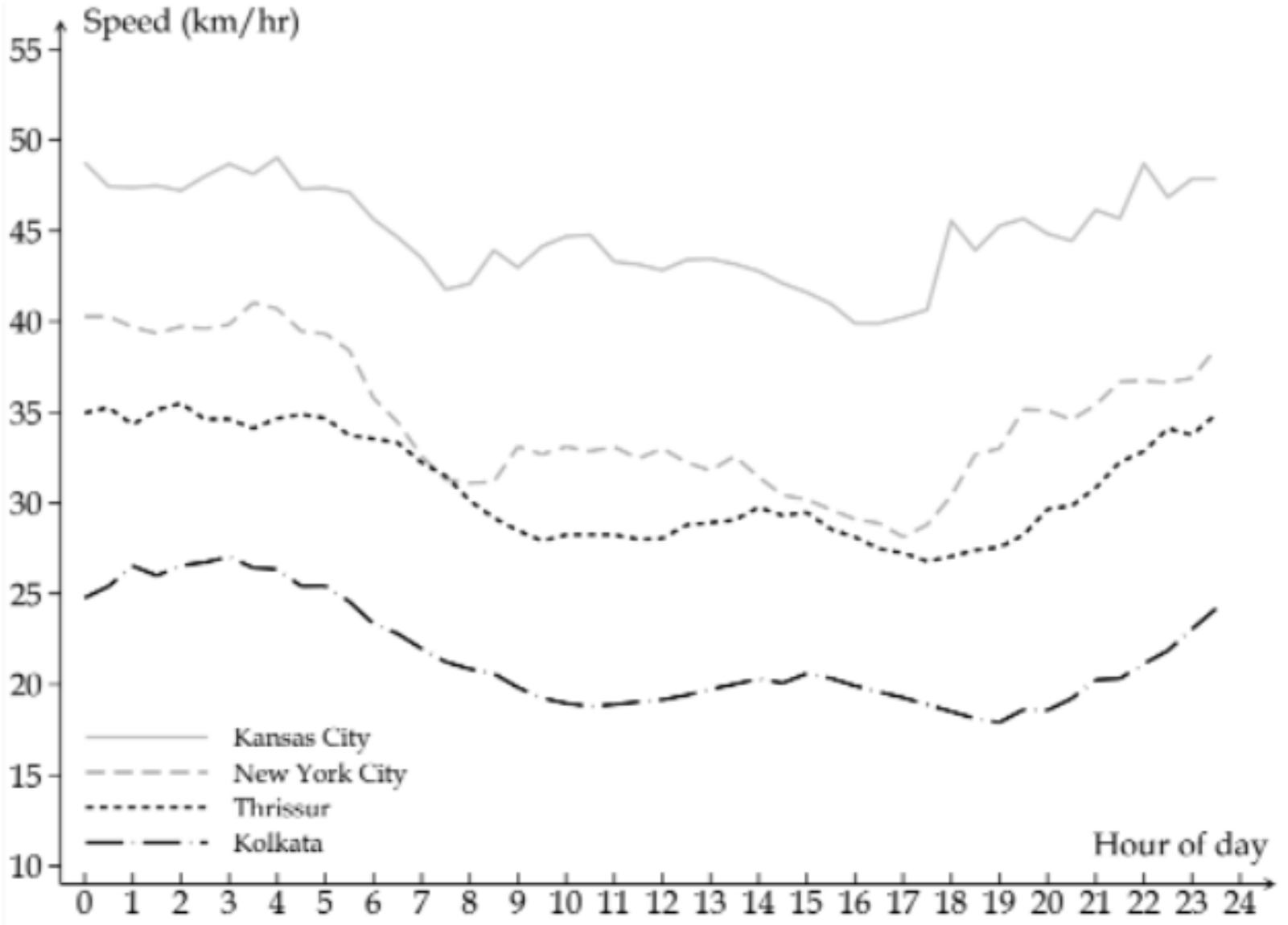
Policy option 5: Congestion pricing

How much should a congestion tax be? How would it re-allocate traffic?

Kreindler (2022): Peak-Hour Road Congestion Pricing: Experimental Evidence and Equilibrium Implications

How big a deal is road congestion?

Figure 1: Speed throughout the day, two Indian vs. two US cities



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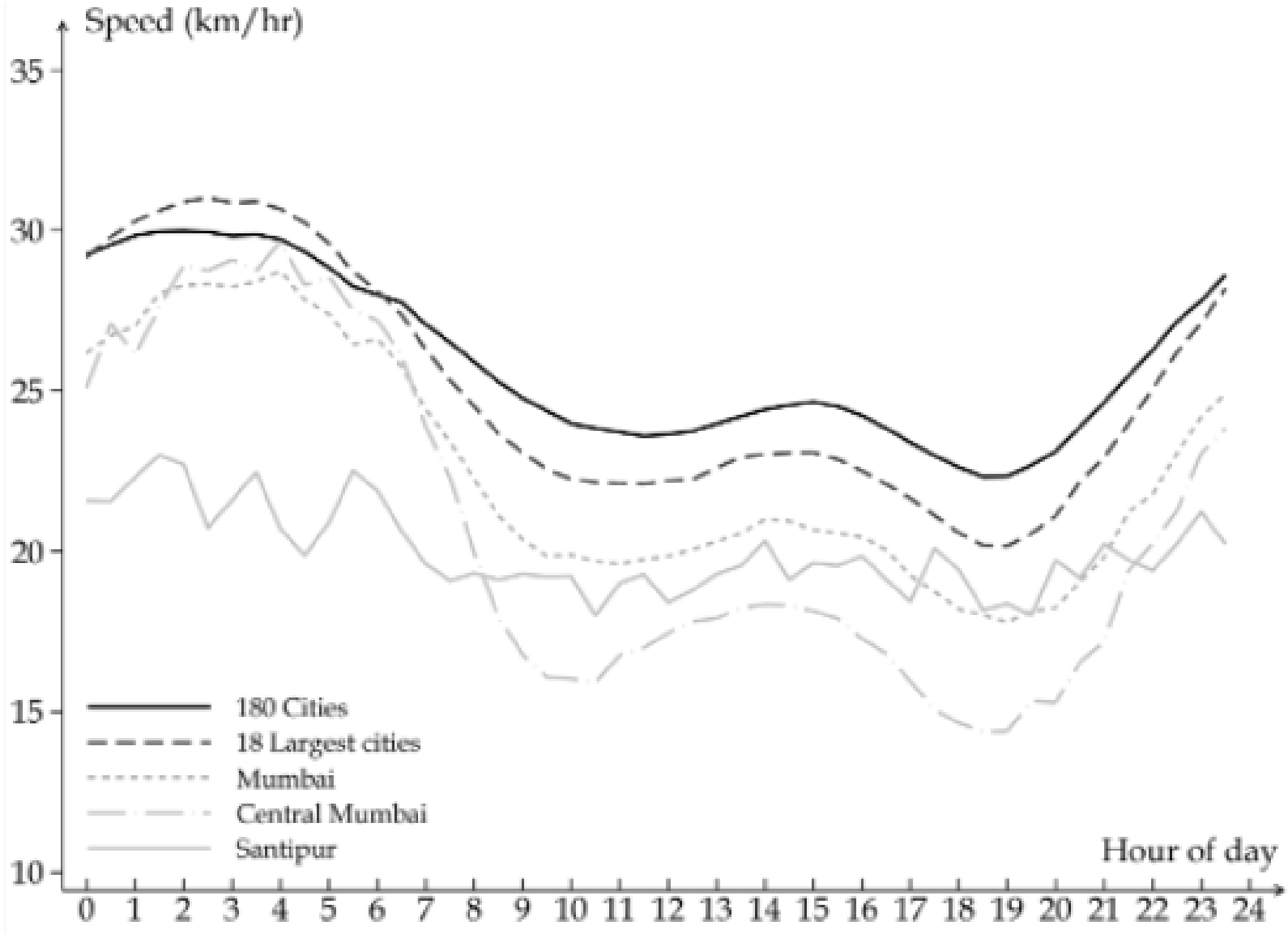

from *Akbar, Couture, Duranton and Storeygard (2022)*

Pricing and allocation of public transportation

Public transport services offer fixed fares, so that it can be equally accessible to everyone. But is it?

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2. Those with high negative externalities?
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3. Those with higher willingness/ability to pay?
4. Price discriminate to generate revenue from some riders and subsidize travel for others?

Other hot topics in Urban Economics

- Urbanization
  - in developing countries
- Persistence and urban growth

Urbanization

- Is urbanization good?
  - Do cities make people more productive or do productive people move to cities?

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See *Bryan, Glaeser and Tsivanidis (2020)* for a review.

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