

Fall 2020

Economics 355

Professor Savage

TRANSPORTATION ECONOMICS AND PUBLIC POLICY

Instructor:

Professor Ian Savage, ipsavage@northwestern.edu

Teaching Assistant:

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Course Description: The objective of this course is to provide the student with an understanding of the transportation industries in the United States and the major policy issues confronting government and the public. All modes of transportation are considered: trucking, highways, mass transit, airlines, maritime, railroads, and pipelines. The course acquaints the student with the underlying economics of transportation provision including: demand, costs, the economics of regulation and regulatory reform, the pricing and quality of service, subsidies, competition between the various modes, and the social appraisal of projects. The course concludes by applying economic tools to two serious transportation problems in American cities - highway congestion, and the level of subsidies to mass transit.

Prerequisites: Economics 281, 310-1, and 310-2.

Lectures: Two synchronous lectures a week on Monday and Wednesday from 11:30AM to 12:50PM. Zoom invitation (with passcode) in Canvas.

Discussion Section: Synchronous weekly discussion sections on Fridays from 11:30AM to 12:50PM. The discussion section on September 18 consists of an overview of the history of U.S. transportation conducted by Professor Savage. Each week the Teaching Assistant also presents a small amount of new material that complements the lectures. Zoom invitation (with passcode) in Canvas.

Office Hours:

Mondays	2:00-4:00	Professor Savage
Tuesdays	10:00-noon	Professor Savage
Tuesdays	3:00-5:00	Alex Doser (not November 3)
Wednesdays	8:30-10:00AM	Alex Doser (not November 4, 24)

Zoom information is in Canvas. No passcode required, but a waiting room is enabled. Additional office hours prior to Midterm Exam 2 and the Final Exam will be announced. You can arrange for an appointment at other times by e-mailing.

Evaluation:

- Seven graded problem sets (20% of the total grade)
- Midterm examination 1 during class at 11:30 CDT on Wednesday October 14 (25%)
- Midterm examination 2 during class at 11:30 CST on Monday November 2 (25%)
[Note daylight saving time ends the day before.]
- Final examination at 9:00AM CST on Wednesday December 2 (30%).

No make-ups are given for the midterm exams. In the event of a pre-approved absence, or a verified illness, additional weight is given to the other midterm exam and the final exam.

Problem Sets: Problem sets are posted in Canvas. They are due at 5:00PM Central Time on Wednesdays in Crowdmark. They are graded and reviewed in the discussion section two days later. The schedule is:

<u>Set #</u>	<u>Submission Deadline</u>	<u>Returned & Discussed</u>
1	5pm September 23	September 25
2	5pm September 30	October 2
3	5pm October 7	October 9
4	5pm October 21	October 23
5	5 pm October 28	October 30
6	5 pm November 11	November 13
7	5 pm November 18	November 2

SYLLABUS AND READINGS

Readings are either:

- Chapters from the book José A Gómez-Ibáñez, William B. Tye and Clifford Winston (eds.) *Essays in Transportation Economics and Policy: A Handbook in Honor of John R. Meyer*, Washington D.C.: Brookings Institution. This is marked as GTW in the listings. The relevant chapters are posted in Canvas.
- Journal and magazine articles posted in Canvas.

Part A - Issues, History and Descriptive Statistics

Topic 1: Why a Course on Transportation Economics?

What is it about transportation that interests economists? What tools do economists have to tackle transportation problems?

Topic 2: History of American Transportation

The history of transportation is marked by changing technology, competition between various forms of transportation, government regulation for most of the twentieth century, and then deregulation in the period since 1980. This topic also considers current and future issues and challenges.

- Emily Badger (2014), “Why Millennials are Shunning Cars,” *Washington Post*, October 14.
- Bruce Schaller (2018), “Second Chances: Regulation and Deregulation of Taxi and For-Hire Ride Services”, *Transportation Research News* 315:43-48.

Topic 3: Descriptive Statistics

The relative importance of individual modes, the traffic they carry, and the market share of the major firms. This topic is presented as part of Problem Set 1.

Part B - Principles of Transportation Economics

This section of the course is designed to equip the student with an understanding of the basic principles of the economics of the provision and regulation of transportation service.

Topic 4 Freight Demand

Transportation is a *derived demand* because manufacturers in place A have profitable opportunities for selling their goods in place B. Models of interregional and international trade are used to derive a demand function for freight service.

Topic 5: Passenger Demand

While in some cases travel may be pleasurable in and of itself, but in general travel occurs because passengers who live at place C derive pleasure from activities at place D. Passenger travel is therefore interconnected with the geographic location of residences, jobs, schools, shops and leisure opportunity. For many trips, passengers have a choice for the mode of travel (driving versus public transit, taking the train versus flying). In making their choice they are responsive to both the price and service quality of rival modes. A major component of transportation service quality is the speed of travel, and hence the journey time. Considerable efforts have been made in the last fifty years to estimate the sensitivity of demand to changes in travel time by calculating the value that people place on time saving.

- GTW Chapter 12 “Transportation and Land Use”
- GTW Chapter 2 “The Demand for Transportation: Models and Applications” (some of this chapter is too advanced for this course. In particular you need not - unless you want to - read the section entitled “Advanced Disaggregate Demand Models” on pages 24-31).
- US Department of Transportation (2016), *The Value of Travel Time Savings: Department of Transportation Guidance for Conducting Economic Evaluations*, US Department of Transportation.

Topic 6: Theory of Costs

The theory of production functions and their associated cost functions. Particular attention is given to specifying “proper cost functions” that are consistent with economic theory.

- GTW Chapter 3 “Learning About Transport Costs”

Topic 7: Empirical Cost Estimation

Empirically investigation of the cost structure of the railroad, trucking, and airline industries. Particular attention is given to whether specific modes display “economies of scale,” and how these economies may arise.

Topic 8: Regulation

Transportation has a long history of governmental intervention and regulation. There was regulatory liberalization and reform in some modes from the late 1970s. While some transportation markets such as trucking, maritime and major air routes can operate effectively as competitive markets, there are other markets where there are fears that only one (“natural monopoly”) or a few firms can survive in the marketplace. Discussion of the form that regulation can take for natural monopolies such as bulk rail movements and pipelines, and the alternatives to regulation that may be applicable to non-bulk rail traffic (intermodal competition), urban bus services (“Demsetz competition”), and airlines (contestability).

- Ian Savage (2006) “Economic Regulation of Transport: Principles and Experience,” in Michael Crew and David Parker (eds.) *International Handbook on Economic Regulation*. Cheltenham, UK: Edward Elgar.
- Various Authors (2018), “40 Years of Transportation Deregulation: Airlines, Railroads, Trucking, Intercity Buses” *Transportation Research News* 315: 3-53.
- Tamer Cetin and Elizabeth Deakin (2019), “Regulation of Taxis and the Rise of Ridesharing,” *Transport Policy* 76:149-158.

Topic 9: Pricing

Pricing of transportation services is problematic. Transportation production is characterized by high fixed costs and relatively low marginal costs. Commercial companies cannot break even or make a profit by setting prices equal to marginal costs. The recovery of fixed costs becomes even more complex because firms offer multiple products (business versus leisure travel, peak versus off-peak travel, grain versus coal) that share the same infrastructure. Even in competitive markets, there are usually a small number of competitors. Models of oligopolistic competition are discussed with an emphasis on empirical methods to determine the competitive strategy that has been adopted by carriers.

- GTW Chapter 4 “Pricing” (pages 99-111, 119-136)

Topic 10: Project Evaluation

Investments in transportation infrastructure usually cannot be evaluated using standard financial evaluation methods. Many investments have the characteristics of public goods (such as untolled highways) or involve costs or benefits that are not usually traded in an open market (such as time saving and the risks of injury). There are frequently spill-over effects on third parties such as noise from airports, visual intrusion from new highways, and pollution of the environment. In the past sixty years evaluations of many large investments in transportation infrastructure have attempted to take these effects into account. The underlying theory is illustrated by case studies.

- GTW Chapter 5 “Project Evaluation”
- US Department of Transportation (2020), *Benefit Cost Analysis Guidance for Discretionary Grant Programs*, US Department of Transportation.
- US Department of Transportation (2016), *Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses*, US Department of Transportation.

Topic 11: Safety

Safety is of considerable concern to passengers and freight shippers but is expensive to provide. The demand for and supply of safety is used to consider the nature of “optimal” safety provision. These desired levels of safety are unlikely to be achieved because there are multiple market failures that require policy interventions that imperfectly correct them.

- Ian Savage (2021), “Economics of Transportation Safety” in In Roger W. Vickerman (ed), *International Encyclopedia of Transportation*, Elsevier.
- Ian Savage (2013), “Comparing the Fatality Risks in United States Transportation across Modes and Over Time” *Research in Transportation Economics* 43: 9-22.

Part C - Contemporary Urban Transportation Problems

Topic 12: Transportation and Urban Form

The evolution of transportation technology led to the development of the modern city. At the same time, urban land use has led to the “urban transportation problem” characterized by road congestion, parking difficulties, environmental concerns, difficulties for pedestrians, road accidents, over-crowding on public transit in the peak hours, and infrequency of provision in the off-peak. The objective of the final part of the course to understand how some of these “problems” arose and evaluate possible solutions.

- GTW Chapter 10 “Determinants of Motorization and Road Provision”

Topic 13: Congestion Pricing Theory

Excessive road congestion occurs because individual motorists do not take account of the delay they impose on other motorists by traveling at peak times on congested roads. Economists have derived both simple static and more complex dynamic models to explore why congestion occurs and how imposition of a congestion toll can mitigate the problem. While presented in a highway context, these pricing principles are also applicable to other congested facilities such as airport runways and maritime locks.

- Richard Arnott (2015), "A Bathtub Model of Downtown Traffic Congestion" *Access* 46: 26-33.

Topic 14: Road Pricing Practice

Development of transponder technology since 1990 has transformed theoretical models into practical solutions. Imposition of congestion-varying pricing has become quite common. The discussion is illustrated by applications in Southern California, London, Stockholm, Singapore and Northern Virginia.

- Various Authors (2003-2017), Press Clippings on Solutions to Urban Road Congestion.

In addition, the decline of traditional funding streams such as the gas tax have led to an interest in alternative funding models such as introducing tolls on previously untolled facilities or moves to mileage-based user fees, both of which could vary with the level of congestion encountered.

- Paul Sorenson (2013), "From Fuel Taxes to Mileage Fees" *Access* 43: 13-19.
- Asha Weinstein Agrawal, Hilary Nixon and Ashley M. Hooper (2017) "Public Perception of Mileage-Based User Fees" *Transportation Research News* 308: 28-33.
- Congressional Budget Office (2016), *Approaches to Making Federal Highway Spending More Productive* Congressional Budget Office.

Road traffic can also be managed by the pricing of on-street (meter) and off-street (garage) parking. Moreover, mispricing of parking can contribute to congestion as vehicles cruise to find vacant spots

- Robert Hampshire and Donald Shoup (2019), "How Much Traffic is Cruising for Parking?", *Transfers Magazine*, Fall 2019: 1-4.
- Gregory Pierce and Donald Shoup (2013) "SFpark: Pricing Parking by Demand" *Access* 43: 20-28.
- Gregory Pierce, Hank Willson and Donald Shoup (2015), "Optimizing the Use of Public Garages: Pricing Parking by Demand" *Transport Policy* 44: 89-95

Topic 15: Transit Subsidies

Since the 1960s, operators of transit services have not traded commercially. Substantial funding has been provided both for capital and operating expenses from municipal, state, and federal funds. The origins of the need for subsidy is investigated. Then, the rationales for transit subsidies are critically examined, as is the trade-off that transit agencies face in deciding whether to use subsidies to reduce fares or improve service frequencies.

- GTW Chapter 4 “Pricing” (pages 111-119)
- GTW Chapter 11 “The Urban Transportation Problem: A Reexamination and Update”

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