Lectures' Outlines and Reading Lists

Prof. Stef PROOST, Center for Economic Studies, Faculty of Economics, Katholieke Universiteit Leuven, Belgium (School Coordinator).
Topic: Transport externalities in general equilibrium and partial equilibrium models.

Rather broad introduction to the Summer School covering:

a) Basic Welfare Economics: general equilibrium framework with environmental and congestion externalities – when is a partial equilibrium approach justified – issues of income distribution.

Lecture material: Own lecture notes + A.Sandmo, "The public economics of the environment", the Lindahl Lectures- Oxford University Press, 2000 +Mayeres & Proost, (2001). Marginal tax reform, externalities and income distribution. Journal of Public Economics, 79(2), 343-363.

b) Choice of environmental policy instruments in partial and general equilibrium framework.

Lecture material: Calthrop, Proost S. "Environmental pricing in transport" Chapter in Henscher & Button (eds.) "Handbook of Transport and Environment", Pergamon press + Goulder, L. H., Parry, I.W.H., Williams III, R.C., And Burtraw, D., (1999), The cost-effectiveness of alternative instruments for environmental protection in a second-best setting, Journal of Public Economics, vol. 72, pp. 329-360.

c) Discussion of basics of air pollution and Greenhouse gas emissions.

Lecture material: Parry, Walls and Harrington, Automobile externalities and policies, JEL, June 2007, p 373-399 - Barrett S. (2007) "Climate treaties and breakthrough technologies", AER, papers and proceedings, May 2006 , p 22 – 30 + synthesis of papers on fuel efficiency standards.

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Prof. David BROWNSTONE, University of California at Irvine, USA
Topic: Econometric models of vehicle ownership and use, choice of new vehicle types, econometric studies of effects of land use (coordination with M.Turner)

a) Review of discrete choice modeling:

Lecture Notes + "Discrete Choice Modeling for Transportation." in D. Hensher (ed.), Travel Behaviour Research: The Leading Edge. Amsterdam: Pergamon, pp. 97-124, 2001.

b) Vehicle choice models including revealed and stated preference data.

Lecture Material: "Joint Mixed Logit Models of Stated and Revealed references for Alternative-fuel Vehicles." (with D. S. Bunch and K. Train), Transportation Research B, 34, 315-338, 2000.

c) Joint Vehicle choice and utilization models.

Lecture Material: "A Vehicle Ownership and Utilization Choice Model With Endogenous Residential Density" (D. Brownstone and H. Fang), May, 2009.

d) Econometric Studies of land use and vehicle use.

Lecture Material: "The Impact of Residential Density on Vehicle Usage and Energy Consumption" (with T. Golob), Journal of Urban Economics, 65, pp. 91-98, 2009.

Prof. André DE PALMA, Ecole Normale Supérieure de Cachan, France
Topic: Modeling transport in urban areas: dynamic models of traffic and emissions - bottleneck versus network models, effects of alternative traffic pricing policies

The original formulation of static models dates back to 1956, and is due to Martin Beckmann, et al.

1. We plan to present the basic methods and describe them for simple (toy) networks.
2. We will also discuss the practical implementation of those models.

The demand model, in the original formulation is static and deterministic. Later on, a stochastic version of the demand has been introduced. The demand model is derived from the discrete choice models, as introduced by D. McFadden (Nobel Laureate, 2000).

3. We plan to present a version of the static model in a competitive environment, when demand is stochastic (modelled by a discrete choice model).

The first dynamic model presented will be based on the stable dynamic approach, which provides a intermediary situation between static and truly dynamic model.

4. We will present the equilibrium and the optimal solutions of the stable dynamic model.

The first truly dynamic model was due to William Vickrey (1969). He models departure time for one origin, one destination and one route. W. Vickrey received the Nobel Price in 1996 for his contribution in auction theory.

5. Presentation of the original Vickrey model (one origin, one destination and one route).

This model has been extended in multiple manner, by Arnott, de Palma and Lindsey.

6. Presentation of elastic demand, routes in parallel, paradox, pricing, stochastic queue, etc.

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The basic model has been extended to incorporate a discrete choice model as a demand model. The case of stochastic queuing time has also been worked out.

7. Stochastic demand and the W. Vickrey model. Stochastic queue and the W. Vickrey model. Provision of information (theory and example in a simplified static case), information congestion.

Dynamic models have been implemented, and can be used to simulate large networks (with a few hundreds of nodes and a few thousand links).

8. Presentation of the software METROPOLIS

Standard transportation models can be imbedded in land use models.

9. Integration Transportation model: the state of the art.

References

Anderson, S. and A. de Palma, 2009. Information Congestion. RAND Journal of Economics.

Arnott, R., A. de Palma, and R. Lindsey (1991). Does Providing Information to Drivers Reduce Traffic Congestions?, Transportation Research, 25A, 309-318.

Arnott, R., A. de Palma and R. Lindsey (1993), A Structural Model of Peak-Period Congestion: A Traffic Bottleneck with Elastic Demand, American Economic Review, 83, 161-179.

Arnott, R., A. de Palma & R. Lindsey (1998), Recent Developments in the Bottleneck Model, in Road Pricing, Traffic Congestion and the Environment, K. Button & E. Verhoef (eds.), Elgar's Economics, 79-110.

Beckmann M., McGuire, and C.B., Winston, C., 1956. Studies in the economics of transportation, Doctoral Dissertation. Yale University Press, New Haven, CT.

de Palma, A., F. Marchal and Yu. Nesterov (1997), METROPOLIS: Modular System for Dynamic Traffic Simulation, Journal of the Transportation Research Board, 1607, 178-184.

Nesterov, Y. and A. de Palma (2003), Stationary Dynamic Solutions in Congested Transportation Networks: Summary and Perspectives, Networks and Spatial Economics, 371-395.

Sheffi, Y. (1985). Urban Transportation Networks: Equilibrium Analysis with Mathematical Programming Methods, Prentice-Hall, Englewood Cliffs, N.J.

Vickrey, William S, 1969. Congestion Theory and Transport Investment, American Economic Review, 59(2), 251-60.

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Prof. Bruno DE BORGER, University of Antwerp, Belgium
Topic: Taxation of cars, company cars, and work trips

a) Commuting, congestion and taxation of work trips: how to tax work trips under different assumptions on the structure of the labor market.

Lecture material: Parry and Bento, Revenue recycling and the welfare effects of road pricing, Scandinavian Journal of Economics 103 (4), 2001; Van Dender, Transport taxes with multiple trip purposes, Scandinavian Journal of Economics 105 (2), 2003; De Borger, Commuting, Congestion tolls and the structure of the labor market: Optimal congestion pricing in a wage bargaining model, Regional Science and Urban Economics 39, 2009.

b) Company cars, congestion and taxation of work trips

Lecture material: Katz and Mankiw, How should fringe benefits be taxed?, National Tax Journal XXXVIII, 1985; Parry and Bento, Tax deductions, environmental policy and the double dividend hypothesis, Journal of Environmental Economics and Management, 2000; De Borger and Wuyts, Commuting, the labor market and the tax treatment of company cars in a model of optimal congestion taxes, unpublished, june 2009.

c) The tax treatment of cars

Lecture material: Fullerton and West, Can taxes on cars and on gasoline mimic an unavailable tax on emissions, Journal of Environmental Economics and Management 43, 2002; Fullerton and Gan, Cost-effective policies to reduce vehicle emissions, American Economic Review Papers and Proceedings, May 2005; De Borger and Mayeres, Optimal taxation of car use, car ownership and public transport, European Economic Review, 2007.

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Prof. Matthew TURNER, University of Toronto, Canada
Topic: Land use and transport externalities

Transportation and land use

EAERE Summer school, Venice, 2009[1]

Matt Turner

updated 1 June 2009

1. Introduction

We would like to understand the the effect that transportation investments have on the way an economy operates and on the welfare of its residents. Ideally, we can resolve this question with sufficient accuracy to be of use to the World Bank, where they must confront questions like "Should we build subways or highways in Kuala Lampur, and how extensive should they be?" In my opinion, economists as yet, do not have much to say about these questions.

In an ideal world, this problem could be resolved easily. We would consider a set of identical cities, treat half of them with subway systems, designing them carefully so that the sample variation allowed us to think about the implications of different extents and designs, and watch what happened over the next two or three generations. Given such an experiment, it would fairly straightforward to resolve the questions I pose above.

This experiment is silly, so we are left to make what inference we can by observing the world around us, generated as it is by an equilibrium rather than an experimental process. Such data poses at least three important problems.

First, transportation investments, roads and public transit, are often very long lasting: Rue St. Jaques in Paris was built by the Romans, the US interstate System has so far lasted several decades. This means that an evaluation of these investments needs to be done over generational time scales in which land use, trade patterns, the locations of populations, and production patterns can adjust to the new infrastructure.

Second, since data are generated by an equilibrium rather than an experimental process, cross-sectional inference is problematic. If we see more development in cities with more roads, is this because the process which assigns roads to places favors those which are developing faster, is it because roads cause growth, or do roads attract more productive people and capital? The welfare implications of these three stories are completely different. In the first case, roads have no causal effect on the development process, in the second they do, in the third, they serve to move development from one place to another.

Third, it is difficult to make inference about the welfare effects of transportation investments in this environment. At a minimum, we confront the standard specification problems that beset any effort to make welfare statements: have we specified utilities reasonably, are we focusing on the empirically relevant margins of substitution, have we separated demand effects from supply effects, etc. However, since we consider long run problems, we also need to worry about migration and sorting. The good news is that many transportation investments can be expected to be capitalized into land prices, and land rent is relatively a straight forward to measure and interpret.

I propose to discuss a few of the interesting questions related to transportation that economists have not dealt with, and then to describe a few papers (some of them my own) which are trying to answer these questions.

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I will discuss three main topics: 1. Instrumental variables estimation; 2. land rent and welfare; 3. Papers which analyze the effect of transportation on the economic development of cities, broadly defined.

Main readings: Wooldridge (2001), Stock and Yogo (2005), Baum-Snow (2007),Duranton and Turner (2008*a*) Duranton and Turner (2008*b*), Michaels (2008),Chandra and Thompson (2000) Glaeser and Kahn (2004).

References

Baum-Snow, Nathaniel. 2007. Did highways cause suburbanization? *Quarterly Journal of Economics* 122(2):775–805.

Chandra, Amitabh and Eric Thompson. 2000. Does public infractsructure affect economic activity? Evidence from the rural interstate highway system. *Regional Science and Urban Economics* 30(4):457–490.

Duranton, Gilles and Matthew A. Turner. 2008*a*. Urban growth and transportation. Processed, University of Toronto.

Duranton, Gilles and Matthew A. Turner. 2008*b*. The fundamental law of highway congestion:evidnece from the us. Processed, University of Toronto.

Glaeser, Edward L. and Matthew E. Kahn. 2004. Sprawl and urban growth. In Vernon Henderson and Jacques-François Thisse (eds.) *Handbook of Regional and Urban Economics*, volume 4. Amsterdam: North-Holland, 2481–2527.

Michaels, Guy. 2008. The effect of trade on the demand for skill - Evidence from the Interstate Highway System. *Review of Economics and Statistics* 90(forthcoming).

Stock, James H. and Motohiro Yogo. 2005. Testing for weak instruments in linear IV regression. In Donald W.K. Andrews and James H. Stock (eds.) *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*. Cambridge: Cambridge University Press, 80–108.

Wooldridge, Jeffrey M. 2001. *Econometric Analysis of Cross Sction and Panel Data*. First edition. Cambridge MA: MIT press.

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