

AEC 653: Empirical Environmental & Resource Economics

Winter 2017

TR 10:00 – 11:20 AM

Strand Ag. Hall 263

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Office Hours: MW 12:30-1:30; TR 3:00 – 4:00; or by email appointment

Course Canvas Site: <https://oregonstate.instructure.com/courses/1624736>

Prerequisites: AEC 513; AEC 525

Students must be comfortable with a first-year Ph.D. level treatment of micro theory and econometrics. Past graduate training in environmental economics, econometrics, and experience with statistical software and programming will be useful, but are not required.

Course Description: This course introduces empirical methods at the current frontiers of research in environmental and resource economics. General topics include the identification of non-market values, revealed and stated preference methods, environmental policy evaluation, land-use modeling, and climate econometrics.

Course Objectives: My objectives for this course are to:

1. Familiarize students with the contemporary themes in environmental and resource economics research and in my sub-field of non-market valuation.
2. Provide students with a solid foundation in the recent advances in the empirical methods related to the valuation of environmental goods and services.
3. Increase students' ability to define empirical environmental and resource economic problems, analyze information, and develop research questions.
4. Provide students with a foundation for conducting applied research in environmental and resource economics (e.g. Ph.D. dissertation)

Learning Outcomes: Upon successful completion of this course, a student will be able to:

1. Pursue research on a range of topics in environmental and resource economics and non-market valuation and, for those seeking employment in academia, teach a similar course to this one in the future.
2. Explain the economic models of non-market valuation and have the foundational knowledge to understand the challenges and apply the methods to environmental and resource issues.
3. Describe and critically evaluate the empirical evidence relevant to the application of economic models to environmental and natural resource issues.
4. Frame and discuss environmental and resource issues and policy in terms of economic theory and empirical evidence.

Learning Resources: The readings for this course are primarily journal articles. There are no required textbooks for this course, but I provide the following list of useful references:

- *Handbook of Environmental Economics, Vol 1-3*
- Freeman, *Measurement of Environmental and Resource Values*
- Bockstael & McConnell, *Environmental & Resource Valuation w/ Revealed Preferences*
- Phaneuf & Requate, *A Course in Environmental Economics: Theory, Policy, Practice*
- Cameron and Trividi, *Microeconometrics: Methods and Applications*
- Manski, *Identification for Prediction and Decision*
- Train, *Discrete Choice Methods with Simulation*
- Angrist and Pischke, *Mostly Harmless Econometrics*

Evaluation

Class and Seminar Participation: 15 %

This course is designed to provide seminar-style discussion of journal articles at the frontier of research in environmental and resource economics. For this to be successful, active participation in class discussion is necessary and expected. Additionally, the AEC department has an Environmental Working Group that meets approximately 3 Wednesdays at noon during the quarter. I expect students to attend each seminar and be prepared to discuss the work presented the next day in class.

Student Lecture: 25%

Each student will be assigned a set of 2 to 3 empirical papers to lead a discussion on their assigned topic for an in-class lecture. The format for this lecture is at your discretion and we will discuss in

class some potential options. Potential papers are indicated in the reading list below with an asterisk (*).

Problem Sets: 20 %

One to two problem sets will be given addressing relevant econometric questions associated with the assigned readings. These will require running models and simulations in Stata and/or Matlab software. Students may use the software of their choosing but solutions and discussion will use Stata and Matlab exclusively. These may be completed in small groups but each student is responsible for handing in their own assignment.

Quarter-long Assignment: 40 %

There are four interrelated assignments that are organized around the theme of how environmental economics is used to inform decisions about public policy. You will first need to choose one of the following revealed preference frameworks for predicting the benefits of an environmental policy to study:

1. Equilibrium sorting framework
2. Hedonic property value framework
3. Recreation demand framework

Assignment #1—Analytical Framework (Fri. January 27th @ 5PM)

Prepare an analytical summary of your chosen revealed preference framework. It must include a conceptual model of how consumers' preferences for an environmental policy affect their choices in a housing or recreation market and an econometric model that uses market outcomes to infer consumer preferences.

Assignment #2—Empirical Application & Policy Assessment (Fri. February 17th @5PM)

Prepare a brief review that contrasts the data, empirical models, and results of a few assigned articles that apply your chosen framework. Second, provide a critical assessment of the way your framework is used by economists in academia and/or government to assess the benefits of prospective policies, using assigned articles and government reports.

Assignment #3—Validation and Research Question (Tues. March 14th @ 10 AM)

Propose a research question and then develop a research design for testing the validity of your revealed preference framework to answer your question.

Assignment #4— In-Class Presentation (Last week of class March 14th & 16th)

Prepare a 15 minute conference-style presentation summarizing the work you have completed on this assignment with a focus on Assignment #3.

Course Outline & Reading List: This is a general course outline and reading list subject to additions and subtractions. Please reference the Canvas site for PDFs of the assigned readings.

Readings with **authors in bold** (and listed first) are required while all others are highly recommended. Readings with an asterisk (*) indicate potential papers for student lectures.

Part I: Identification of Nonmarket Values

Foundations of Nonmarket Valuation

Bocksteal and McConnell: Chapters 2 and 3

Herriges, J. A., C.L. Kling, and D.J. Phaneuf. 2004. "What's the Use? Welfare Estimates from Revealed Preference Models when Weak Complementarity Does not Hold." *Journal of Environmental Economics and Management*. 47: 55-70.

Willig, R.D. 1976. Consumer Surplus Without Apology. *American Economic Review*, 66(4):589-597.

Banzhaf, H.S. and V.K. Smith. 2004. "A Diagrammatic Exposition of Weak Complementarity and the Willig Condition." *American Journal of Agricultural Economics*, 86(2): 455-466.

Hanemann, W.M. 1991. Willingness to Pay and Willingness to Accept: How much can they differ? *American Economic Review*. 81(3) 635-647.

Palmquist, R.B. 2005. Weak Complementarity, Path Independence, and the Intuition of the Willig Condition. *Journal of Environmental Economics and Management*, 49(1): 103-115.

Randall, A. and J.R. Stoll. 1980. Consumer Surplus in Commodity Space. *American Economic Review*, 70(3):449-455.

Empirical Identification of Nonmarket Values

Kuminoff, N.V. 2009. "Decomposing the Structural Identification of Nonmarket Values." *Journal of Environmental Economics and Management*, 57(2): 123-139.

Berry, S., J. Levinsohn, and A. Pakes. 1995. Automobile Prices in Market Equilibrium. *Econometrica*, 63(4): 841-890.

Ekeland, I., J.L. Heckman, and L. Nesheim. 2004. Identification and Estimation of Hedonic models. *Journal of Political Economy*. 112(1): 60-109.

Part II: Housing Market Models

Phanuef D.J. and T. Requate. "Chapter 18 Property Value Models" from their forthcoming new textbook. *provides a good review for housing market models.

Hedonic Models

Kuminoff N.V., C.F. Parmeter, and J.C. Pope. 2010. Which hedonic models can we trust to recover the marginal willingness to pay for environmental amenities? *Journal of Environmental Economics and Management*, 60: 145-160.

Kuminoff N.V. and J.C. Pope. 2014. Do "Capitalization effects" for Public Goods Reveal the Public's Willingness to Pay?" *International Economic Review*, 55(4):1227-1250.

Abbott, J.K. and H.A. Klaiber. 2011. An Embarrassment of Riches: Confronting Omitted Variable Bias and Multiscale Capitalization in Hedonic Price Models. *Review of Economics and Statistics*, 93(4): 1331-1342.

Black, S. E. 1999. "Do Better Schools Matter? Parental Valuation of Elementary Education." *Quarterly Journal of Economics*, 114(2): 577-599.

* **Bishop, K. and C. Timmins.** 2015. "Estimating the Marginal Willingness to Pay Function without Instrumental Variables". *NBER Working Paper #17611*.

* **Davis, L.** 2004. "The Effect of Health Risk on Housing Values: Evidence from a Cancer Cluster." *American Economic Review*, 94(5): 1693-1704.

Bishop K. and A. Murphy. 2016. Valuing Time-Varying Attributes using the Hedonic Model: When is a Dynamic Approach Necessary? *Working paper*.

Palmquist, R.B. 1984. Estimating the Demand for the Characteristics of Housing." *Review of Economics and Statistics*, 66(3): 394-404.

Rosen, S. 1974. Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, 82(1): 34-55.

Sorting Models

Bayer, P., R.McMillan, A. Murphy, and C. Timmins. 2016. A Dynamic Model of Demand for Houses and Neighborhoods. *Econometrica*, 84(3):893-942.

Kuminoff, N.V. V.K. Smith, and C. Timmins. 2013. The New Economics of Equilibrium Sorting and Policy Evaluation Using Housing Markets. *Journal of Economic Literature*, 51(4):1007-1062.

- * **Banzhaf, H.S., and R.P. Walsh.** 2013. Segregation and Tiebout Sorting: Investigating the Link Between Investments in Public Goods and Neighborhood Tipping. *Journal of Urban Economics*. 74: 83-98.
 - * **Banzhaf, H.S. and R.P. Walsh.** 2008. Do People Vote with Their Feet? An Empirical Test of Tiebout's Mechanism. *American Economic Review*, 98(3): 843-63.
 - * **Bayer, P., N. Keohane, and C. Timmins.** 2009. Migration and Hedonic Valuation: The Case of Air Quality. *Journal of Environmental Economics and Management* 58: 1-14.
 - * **Klaiber, H. A. and D.J. Phaneuf.** 2010. Valuing Open Space in a Residential Sorting Model of the Twin Cities. *Journal of Environmental Economics and Management*, 60(2): 57-77.
 - * **Smith, V.K., H. Sieg, H.S. Banzhaf, and R. Walsh.** 2004. General Equilibrium Benefits for Environmental Improvements: Projected Ozone Reductions under EPA's Prospective Analysis for the Los Angeles Air Basin. *Journal of Environmental Economics and Management*, 47(3): 559-584.
- Bieri, D., N.V. Kuminoff, and J.C. Pope. 2013. National Expenditures on Local Amenities. *Working Paper*.
- Kuminoff, N.V. 2012. Partial Identification of Preferences in a Dual-Market Sorting Equilibrium. *Working Paper*.

Quasi-experiments and Policy Evaluation

- Greenstone M., and T. Gayer.** 2009. Quasi-experimental and experimental approaches to environmental economics. *Journal of Environmental Economics and Management*, 57: 21-44.
- Klaiber, H. A. and V. K. Smith.** 2013. Quasi-Experiments, Hedonic Models, and Estimating Tradeoffs for Local Amenities. *Land Economics*. 89: 413-431.
- Parmeter, C.F. and J.C. Pope.** 2009. Quasi-experiments and Hedonic Property Value Methods. In *Handbook of Experimental Economics and the Environment*, John List and Michael Price (eds.)
- Greenstone, M. and J. Gallagher.** 2008. Does Hazardous Waste Matter? Evidence from the Housing Market and Superfund Program. *Quarterly Journal of Economics*. 123(3): 951-1003.
- * **Abbott, J. K. and H.A. Klaiber.** 2013. "The Value of Water as a Club Good: A Matching Approach to Community-Provided Lakes." *Journal of Environmental Economics and Management*. 65: 208-224.
- * **Bento, A., M. Freedman, and C. Lang.** 2015. Who Benefits from Environmental Regulation? Evidence from the Clean Air Act Amendments. *Review of Economics and Statistics*, 97(3):610-622.
- * **Chay, K.Y. and M. Greenstone.** 2005. Does Air Quality Matter? Evidence from the Housing Market. *Journal of Political Economy*. 113(2): 376-424.

* **Dundas, S.J.** 2017. Benefits and Costs of Natural Infrastructure: Evidence from the New Jersey Coast. *Working Paper*.

* **Muelenbachs, L., E. Spiller, and C. Timmins.** 2015. The Housing Market Impacts of Shale Gas Development. *American Economic Review*, 105(12): 3633-3659.

Gamper-Rabindran, S., and C. Timmins. 2013. "Does Cleanup of Hazardous Waste Sites Raise Housing Values: Evidence of Spatially Localized Benefits." *Journal of Environmental Economics and Management*. 65: 345-360.

Sieg, H., V. K. Smith, H. S. Banzhaf, and R.P. Walsh. 2004. Estimating the General Equilibrium Benefits of Large Changes in Spatially Delineated Public Goods. *International Economic Review*. 45(4): 1047-1077.

Part III: Recreation Demand Modeling

Phaneuf, D.J. and V.K. Smith. 2005. Recreation Demand Models. In *Handbook of Environmental Economics, Volume 2*, ed. Karl-Gran Maler and Jeffery R. Vincent. Amsterdam: North Holland Publishing.

* **Dundas, S.J. R. von Haefen, and C. Mansfield.** 2017. Costs of Endangered Species Protection on Public Lands: Evidence from Cape Hatteras National Seashore. *Working Paper*.

* **Hauber, A.B., and G.R. Parsons.** 2000. The effect of nesting structure specification on welfare estimation in a random utility model of recreation demand: An application to the demand for recreational fishing. *American Journal of Agricultural Economics* 82 (3): 501-14.

* **Hindsley, P., C.E. Landry, and B. Gentner.** 2011. Addressing onsite sampling in recreation site choice models. *Journal of Environmental Economics and Management*. 62 (1): 95-110.

Hausman, J. A., G.K. Leonard, and D. McFadden. 1995. A utility consistent, combined discrete choice and count data model assessing recreational use losses due to natural resource damage. *Journal of Public Economics* 56 (1): 1-30.

Herriges, J.A. and C.L. Kling. 1997. The performance of nested logit models when welfare estimation is the goal. *American Journal of Agricultural Economics* 79 (3): 792-802.

Morey, E.R., R.D. Rowe, and M. Watson. 1993. A repeated nested-logit model of Atlantic salmon fishing. *American Journal of Agricultural Economics* 75 (3): 578-92.

Murdock, J. 2006. Handling unobserved site characteristics in random utility models of recreation demand. *Journal of Environmental Economics and Management* 51 (1): 1-25.

Parsons, G.R., A. J. Plantinga, and K. J. Boyle. 2000. Narrow choice sets in a random utility model of

recreation demand. *Land Economics* 76 (1): 86-99.

Part IV: Climate Change Economics

Albouy, D., W. Graf, R. Kellogg, and H. Wolff. 2016. Climate Amenities, Climate Change, and American Quality of Life. *Journal of the Association of Environmental and Resource Economists*. 3(1): 205-246.

Auffhammer, M., S.M. Hsiang, W. Schlenker, and A. Sobel. 2013. Using Weather Data and Climate Model Output in Economic Analyses of Climate Change. *NBER Working Paper* 19087.

Hsiang, S.M. 2016. Climate Econometrics, *NBER Working Paper* 22181

* **Burke, M., J. Dykema, D. B. Lobell, E. Miguel, and S. Satyanath.** 2015. Incorporating climate uncertainty into estimates of climate change impacts. *Review of Economics and Statistics* 97 (2): 461-71.

* **Deryugina T., and Hsiang S.M.** 2014. Does the environment still matter? Temperature and income in the United States. *NBER Working Paper* 20750.

* **Graff Zivin, Joshua, and Matthew Neidell.** 2014. Temperature and the allocation of time: Implications for climate change. *Journal of Labor Economics* 32 (1): 1-26.

Auffhammer, M. and A. Aroonruengsawat. 2011. Simulating the impacts of climate change, prices and population on California's residential electricity consumption. *Climate Change* 109 (1): 191-210.

Burke, M., and K. Emerick. 2016. Adaptation to climate change: Evidence from US agriculture. *American Economic Journal: Economic Policy*, 8(3):106-140.

Dell, M., B. F. Jones, and B.A. Olken. 2014. What do we learn from the weather? The new climate-economy literature. *Journal of Economic Literature* 52 (3): 740-98.

Dundas, S.J. and R. von Haefen. 2016. Weather Effects on the Demand for Coastal Recreation Fishing: Implications for a Changing Climate. *Working Paper*.

Schlenker, W., and M.J. Roberts. 2009. Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change. *Proceedings of the National Academy of Sciences* 106 (37): 15594-98.

Part V: Land Use Modeling

- Bockstael, N.E.** 1996. Modeling economics and ecology: the importance of a spatial perspective. *American Journal of Agricultural Economics* 78: 1168-1180.
- Lubowski, R. N., A.J. Plantinga, and R.N. Stavins.** 2006. Land-use change and carbon sinks: econometric estimation of the carbon sequestration supply function. *Journal of Environmental Economics and Management* 51: 135-152.
- Stavins, R.N., and A.B. Jaffe.** 1990. Unintended impacts of public investments on private decisions: the depletion of forested wetlands. *The American Economic Review* (1990): 337-352.
- * **Irwin, E.G., and N.E. Bockstael.** 2002. Interacting agents, spatial externalities and the evolution of residential land use patterns. *Journal of Economic Geography* 2: 31-54.
- * **Sims, K., and J.M. Alix-Garcia.** 2017. Parks versus PES: Evaluating direct and incentive-based land conservation in Mexico. *Journal of Environmental Economics and Management*, In Press.
- * **Zipp, K.Y., D.J. Lewis, and B. Provencher.** 2017. Does the conservation of land reduce development? An econometric-based landscape simulation with land market feedbacks. *Journal of Environmental Economics and Management* 81: 19-37.
- Andam, K.S., et al. 2008. Measuring the effectiveness of protected area networks in reducing deforestation. *Proceedings of the National Academy of Sciences* 105.42 (2008): 16089-16094.
- Wendland, K.J., Baumann, M., Lewis, D.J., Sieber, A. and Radeloff, V.C., 2015. Protected area effectiveness in European Russia: A postmatching panel data analysis. *Land Economics*, 91(1): 149-168.
- Wrenn, D.H., H.A. Klaiber, and D.A. Newburn. 2016. Confronting Price Endogeneity in a Duration Model of Residential Subdivision Development. *Journal of Applied Econometrics*, forthcoming.

Part VI: Stated Preference Methods

- Adamowicz, W., P. Boxall, M. Williams, and J. Louviere.** 1998. Stated Preference Approaches for Measuring Passive Use Values: Choice Experiments and Contingent Valuation. *American Journal of Agricultural Economics* 80(1): 64-75.
- Cummings, R. G., and L. O. Taylor.** 1999. Unbiased Value Estimates for Environmental Goods: A Cheap Talk Design for the Contingent Valuation Method. *American Economic Review* 89 (3): 649-65.

Hanley, N., R.E. Wright, and V. Adamowicz. 1998. Using Choice Experiments to Value the Environment. *Environmental and Resource Economics*, 11: 413-428.

Hausman, J. 2012. Contingent Valuation: From Dubious to Hopeless. *Journal of Economic Perspectives*, 26(4): 43-56.

Kling, C., D. Phaneuf, and J. Zhao. 2012. From Exxon to BP: has some number become better than no number? *Journal of Economic Perspectives* 26(4): 3-26.

* **Interis, M.G., and D.R. Petolia.** 2016. Location, Location, Habitat: How the Value of Ecosystem Services Varies across Location and by Habitat. *Land Economics*, 92(2): 292-307.

* **Johnston, R.J., et al.** 2013. Stated Preferences for Intermediate versus Final Ecosystem Services: Disentangling Willingness to Pay for Omitted Outcomes. *Agricultural and Resource Economics Review*, 42(1): 98-118.

* **Whitehead, J.C., and D.K. Lew.** 2016. Estimation Recreation Benefits through Joint Estimation of Revealed and Stated Preference Discrete Choice Data. Working Paper.

Arrow, K. and R. Solow. 1993. Report of the NOAA panel on contingent valuation. National Oceanic and Atmospheric Administration Washington, DC.

Carson, R. and J. Louviere. 2011. A common nomenclature for stated preference elicitation approaches. *Environmental and Resource Economics* 49:539-559.

Ferrini, S. and R. Scarpa. 2007. Designs with a priori information for nonmarket valuation with choice experiments: A Monte Carlo study. *Journal of Environmental Economics and Management* 53:342-363.

Hanley, N., S. Mourato, and R. Wright. 2001. Choice Modelling Approaches: A superior alternative for Environmental Valuation? *Journal of Economic Surveys* 15:435-462.