

AEC 653: Empirical Environmental & Resource Economics

Winter 2019

TR 10:00 – 11:20 AM

Strand Ag. Hall 111

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Office Hours: TR 12:00-1:30; 4:00 – 5:00, or by email appointment

Course Canvas Site: <https://oregonstate.instructure.com/courses/1704590>

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:

- Phaneuf & Requate: *A Course in Environmental Economics; Theory, Policy, and Practice*
NOTE: This is the new (2017) seminal Ph.D. text for environmental economics. Some chapters are provided on Canvas that I obtained from the authors prior to publication but I highly recommend this book for this course and beyond.
- Cameron and Trividi, *Microeconometrics: Methods and Applications*
- Freeman, *Measurement of Environmental and Resource Values*
- Bockstael & McConnell, *Environmental & Resource Valuation w/ Revealed Preferences*
- Manski, *Identification for Prediction and Decision*
- Train, *Discrete Choice Methods with Simulation*
- Angrist and Pischke, *Mostly Harmless Econometrics*
- *Handbook of Environmental Economics, Vol 1-3*

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 (6 %). Additionally, the AEC department has an Applied Economics Working Group that meets each Wednesday at noon during the quarter. Each student is encouraged to attend every seminar. The participation requirement here is to submit a one-page summary/critique of three (3) presentations (3 % each). **See Seminar Summary assignment on Canvas for more details.**

Student Lecture: 25 %

Each student will be assigned two (2) empirical papers to prepare a 35 - 40 minute lecture to the class. Potential papers for each topic are indicated in the reading list below with an asterisk (*). **See Student Lecture assignment on Canvas for more details.**

Referee Reports: 20 %

Each student will be assigned two (2) working papers to prepare a referee report to a journal editor. You will be asked to summarize the paper, list and discuss the major strengths and weaknesses, and make a recommendation in which quality tier a paper should be published. Reports will be used in this course to

gain experience in critically studying papers. [See Referee Report assignment on Canvas for more details.](#)

Referee Report #1: Due **Friday February 1st @ 5:00 pm**

Referee Report #2: Due **Friday March 1st @ 5:00 pm**

Research Assignment: 40 %

Three groups will form to study a specific type of modeling framework during the quarter. Exercises are provided to gain familiarity with the modeling frameworks. Then, actual data and a set of assignments are assigned and will vary based on the framework. Each group will be responsible for preparation of a final paper and an in-class presentation during the final exam period. The three frameworks are:

Group #1: **Discrete Choice Modeling**

Group #2: **Recreation Demand Modeling**

Group #3: **Hedonic Property Value Modeling**

Course Policies: I have scheduled open office hours each week and I am available by appointment subject to my availability. **Individual office visits may be one of the most productive parts of the course for you.** I am here to help your learning process and development as a scholar.

Statement Regarding Students with Disabilities: Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.

Student Conduct and Academic Integrity: Students are required to comply with Oregon State University policies on student conduct and academic integrity. Academic dishonesty (e.g. cheating, plagiarism) and disruptive behavior will not be tolerated in this course. More information on the university's policies can be found here:
http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf

Religious Holiday Statement: Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

Student Evaluation of Courses: The online Student Evaluation of Teaching system opens to students the Monday of dead week and closes the Monday following the end of finals. Students will receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to "sign" their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.

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

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.
- *Rosen, S.** 1974. Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, 82(1): 34-55.
- *Bishop K. and A. Murphy.** 2018. "Valuing Time-Varying Attributes using the Hedonic Model: When is A Dynamic Approach Necessary?" *Review of Economics and Statistics*. In press
- *Klaiber, H.A., J.K. Abbott, and V.K. Smith.** 2017. Some Like It (Less) Hot: Extracting Trade-Off Measures for Physically Coupled Amenities. *Journal of the Association of Environmental & Resource Economists*, 4(4): 1053-79.
- Palmquist, R.B. 1984. Estimating the Demand for the Characteristics of Housing." *Review of Economics and Statistics*, 66(3): 394-404.
- Bishop, K. and C. Timmins. 2015. "Estimating the Marginal Willingness to Pay Function without Instrumental Variables". NBER *Working Paper #17611*.

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. 2014. 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 ancillary costs of natural infrastructure: Evidence from the New Jersey coast. *Journal of Environmental Economics and Management* 85:62-80.
- * **Muelenbachs, L., E. Spiller, and C. Timmins.** 2015. The Housing Market Impacts of Shale Gas Development. *American Economic Review*, 105(12): 3633-3659.
- * **Walls, M., T. Gerarden, K. Palmer, and X.F. Bak.** 2017. Is energy efficiency capitalized into home prices? Evidence from three U.S. cities. *Journal of Environmental Economics and Management* 82:104-24.
- * **Davis, L.** 2004. "The Effect of Health Risk on Housing Values: Evidence from a Cancer Cluster." *American Economic Review*, 94(5): 1693-1704.
- * **Qui, Y. and S. Gopalakrishnan.** 2018. Shoreline defense against climate change and capitalize impact of beach nourishment. *Journal of Environmental Economics and Management*, 92: 134-47.
- 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.** 2018. Costs of Endangered Species Protection on Public Lands: Evidence from Cape Hatteras National Seashore. *Marine Resource Economics* 33:1-25
- Dundas, S.J. and R. von Haefen.** 2019. The Effects of Weather on Recreational Fishing Demand and Adaptation: Implications for a Changing Climate. Working paper - *Revisions requested at Journal of the Association of Environmental and Resource Economists*
- 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.
- *Murdock, J.** 2006. Handling unobserved site characteristics in random utility models of recreation demand. *Journal of Environmental Economics and Management* 51 (1): 1-25.
- *Thiene, M., J. Swait, and R. Scarpa.** 2017. Choice set formation for outdoor destinations: The role of motivations and preference discrimination in site selection for the management of public expenditures on protected areas. *Journal of Environmental Economics and Management*, 81: 152-173.
- *Fezzi, C., I.J. Bateman, and S. Ferrini.** 2014. Using revealed preferences to estimate the Value of Travel Time to recreation sites. *Journal of Environmental Economics and Management.* 67: 58-70.
- *English, E. R. von Haefen, J. Herriges, C. Leggett, F. Lupi, K. McConnell, M. Welsh, A. Domanski, and N. Meade.** 2018. Estimating the value of lost recreation days from the Deepwater Horizon oil spill. *Journal of Environmental Economics and Management*, 91:26-45.
- 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.
- 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

- Masseti, E. and R. Mendelsohn.** 2018. Measuring Climate Adaptation: Method and Evidence. *Review of Environmental Economics and Policy*, 12(2):124-41.
- Mendelsohn, R. W.D. Nordhaus, and D. Shaw.** 1994. The Impact of Global Warming on Agriculture: A Ricardian Analysis *The American Economic Review*, 84(4): 753-71
- * **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.
- * **Severen, C., C. Costello, and O. Deschenes.** 2018. A Forward-looking Ricardian Approach: Do Land Markets Capitalize Climate Change Forecasts, *Journal of Environmental Economics and Management*. 89: 235-54.
- * **Heutel, G., N.H. Miller, and D. Molitor.** 2017. Adaptation and the Mortality Effects of Temperature Across U.S. Climate Regions. *NBER Working Paper 23271*
- 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.
- 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.
- Beasley, W.J. and S.J. Dundas.** 2019. Hold the Line: Modeling private climate adaptation through coastal armoring decisions. Working Paper.
- Mihari, C. and D.J. Lewis.** 2017 Climate, adaptation, and the value of forestland: A national Ricardian analysis of the United States. Working Paper.

- 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.
- * **Matthews, Y., R. Scarpa, and D. Marsh.** 2017. Using virtual environments to improve the realism of choice experiments: A case study about coastal erosion management. *Journal of Environmental Economics and Management*, 81: 193-208.
- * **Zawojnska, E. A. Bartczak, and M. Czajkowski.** 2019. Disentangling the effects of policy and payment consequentialist and risk attitudes on stated preferences. *Journal of Environmental Economics and Management*, 93:63-84.

- 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.