

Energy Economics

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Energy economics is a growing field in economics. The availability of new data sources and the interest of policy makers make this field an interesting topic for research. Moreover, many deep challenges in Iran are routed in energy policies. The country wastes about 20% of its GDP every year for energy subsidies, and at the same time lack resources to spend on infrastructure, health and education. Additionally, about half of government income is funded by oil revenues yet the government has no strategic plan for its development. Recently, the dominance of petrochemical industry has changed the shape of manufacturing sectors and political lobbies.

This course has an empirical focus and discusses topics in energy and environmental economics. Advanced econometrics methods are discussed in the course and homeworks are based on actual data and replication of recent papers in top journals. We advise students to take “Industrial Organization” and “Applied Econometrics” together or before this course. You need to write referee reports on two job market papers. The Two referee reports are due as indicated in the schedule. Two papers are:

1. Moravvej, M, " Risk, Diversification, and Competition in Trade Networks with evidence from US Natural Gas Market", Chicago Working Paper (2019).
2. Hagerty, N, “The Scope for Climate Adaptation: Evidence from Water Scarcity in Irrigated Agriculture”, MIT Working Paper (2019).

In addition, there will be five homeworks that you need to hand in them individually by strict deadline. You are also required to submit a research proposal under the topics of energy and environmental economics discussed in the course. We suggest you pick a topic and read all papers under the topic in the reading list. At the end of each class we ask one student to discuss the reading paper for the class. If you are absent you will miss the grade of that paper, if you are present in the class but have not read the paper beforehand, you will get half mark. The reading paper is marked with ❖. You need to answer the following questions when I call your name:

- What is the main question of the paper?
- What is the contribution of the paper?
- What method is used in the paper to answer the question?
- What data is employed to answer this question?
- What are findings of the paper?

If you have any critique of the paper, you are welcome to highlight them at the end of your discussion. The research proposal will be discussed during the classes. In summary, the grading of the course is as follows:

- Two referee reports (3 points)
- Five homeworks (3 points)
- Class attendance (2 points)
- Final Exam (8 points)
- Research proposal (4 points) - Research proposal due date is 1399/04/31

Topics and reading list – last updated: 23 January 2020

First part: M.H. Rahmati (Session 1 – Session 10)

Topic 1: Hotelling model

- Devarajan, Shantayanan, and Anthony C. Fisher. "Hotelling's" economics of exhaustible resources": Fifty years later." *Journal of Economic Literature* 19.1 (1981): 65-73.
- Anderson, Soren T., Ryan Kellogg, and Stephen W. Salant. "Hotelling under pressure". *Journal of Political Economy*, 2018
- ❖ Miller, Merton H., and Charles W. Upton. "A test of the Hotelling valuation principle." *Journal of Political Economy* 93.1 (1985): 1-25.

Topic 2: Drilling economy

- Hendricks, Kenneth, and Robert H. Porter. "The timing and incidence of exploratory drilling on offshore wildcat tracts." *The American Economic Review* (1996): 388-407.
- Kellogg, Ryan, "The Effect of Uncertainty on Investment: Evidence from Texas Oil Drilling", *American Economic Review* 104 (June, 2014), 1698-1734.
- Kellogg, Ryan. "Learning by drilling: Interfirm learning and relationship persistence in the Texas oil patch." *The Quarterly Journal of Economics* (2011): qjr039.
- ❖ Covert, Thomas. "Experiential and social learning in firms: the case of hydraulic fracturing in the Bakken Shale." (2015).

Topic 3: Lease auctions

- Hendricks, Kenneth, Joris Pinkse, and Robert H. Porter. "Empirical implications of equilibrium bidding in first-price, symmetric, common value auctions." *The Review of Economic Studies* 70.1 (2003): 115-145.
- Robert Porter, "Recent Developments in the Empirical Analysis of Auction Markets", *Minnesota Applied Micro Workshop*, 2007
- ❖ Hendricks, Kenneth & Porter, Robert H (1988). "An Empirical Study of an Auction with Asymmetric Information," *American Economic Review*, *American Economic Association*, vol. 78(5), pages 865-83, December

Topic 4: Natural Gas, Supply and Demand

- Davis, Lucas W., and Lutz Kilian. "The allocative cost of price ceilings in the US residential market for natural gas." *Journal of Political Economy* 119.2 (2011): 212-241.
- Auffhammer, Maximilian, and Edward Rubin. *Natural Gas Price Elasticities and Optimal Cost Recovery Under Consumer Heterogeneity: Evidence from 300 million natural gas bills*. No. w24295. National Bureau of Economic Research, 2018.
- ❖ Borenstein, Severin, and Lucas W. Davis. "The Equity and Efficiency of Two-Part Tariffs in US Natural Gas Markets." *Journal of Law and Economics* 55 (2012).

Topic 5: Electricity Competition

- Borenstein, Severin, James B. Bushnell, and Frank A. Wolak. "Measuring market inefficiencies in California's restructured wholesale electricity market." *American Economic Review* (2002): 1376-1405.
- Mercadal, Ignacia. "Dynamic competition and arbitrage in electricity markets: The role of financial players." (2018). NBER Working paper

- ❖ Wolfram, Catherine D. "Measuring duopoly power in the British electricity spot market." *American Economic Review* (1999): 805-826

Topic 6: Electricity market and strategic bidding

- Hortaçsu, Ali, and Steve Puller. "Understanding strategic models of bidding in deregulated electricity markets: a case study of ERCOT." *The RAND Journal of Economics* 39 (2008): 86-114.
- Reguant, Mar. "Complementary bidding mechanisms and startup costs in electricity markets." *The Review of Economic Studies* 81.4 (2014): 1708-1742.
- ❖ Puller, Steven L. "Pricing and firm conduct in California's deregulated electricity market." *The Review of Economics and Statistics* 89.1 (2007): 75-87

Topic 7: Electricity supply

- Bushnell, Jim, Erin Mansur, and Celeste Saravia. 2006. "Vertical Arrangements, Market Structure and Competition: An analysis of Restructured U.S. Electricity Markets." *American Economic Review*. Vol 98, No. 1. March 2008
- ❖ Chan, Hei Sing Ron, Maureen L. Cropper, and Kabir Malik. "Why Are Power Plants in India Less Efficient than Power Plants in the United States?" *The American Economic Review* 104.5 (2014): 586-590.

Topic 8: Electricity demand

- Reiss, Peter C., and Matthew W. White. "Household electricity demand, revisited." *The Review of Economic Studies* 72.3 (2005): 853-883
- Jessoe, Katrina, and David Rapson. "Knowledge is (less) power: Experimental evidence from residential energy use." *American Economic Review* 104.4 (2014): 1417-38.
- Ito, Koichiro. "Do consumers respond to marginal or average price? Evidence from nonlinear electricity pricing." *American Economic Review* 104.2 (2014): 537-63.
- ❖ Davis, Steven J., et al. "Electricity Unit Value Prices and Purchase Quantities: US Manufacturing Plants, 1963–2000." *Review of Economics and Statistics* 95.4 (2013): 1150-1165.

Topic 9: Gasoline supply

- Houde, Jean-François. "Spatial differentiation and vertical mergers in retail markets for gasoline." *The American Economic Review* (2012): 2147-2182
- Hastings, Justine S. "Vertical Relationships and Competition in Retail Gasoline Markets: Empirical Evidence from Contract Changes in Southern California." *The American Economic Review* 94.1.
- ❖ Byrne, David P., and Nicolas De Roos. "Learning to coordinate: A study in retail gasoline." *American Economic Review* (2019).
- ❖ Davis, Lucas W., Shaun McRae, and Enrique Seira Bejarano. *An Economic Perspective on Mexico's Nascent Deregulation of Retail Petroleum Markets*. No. w24547. National Bureau of Economic Research, 2018.

Topic 10: Efficiency

- Davis, Lucas W., Alan Fuchs, and Paul Gertler. "Cash for coolers: evaluating a large-scale appliance replacement program in Mexico." *American Economic Journal: Economic Policy* 6.4 (2014): 207-238
- Allcott, Hunt, Christopher Knittel, and Dmitry Taubinsky. "Tagging and targeting of energy efficiency subsidies." *The American Economic Review* 105.5 (2015): 187-191.
- ❖ Gillingham, Kenneth, Richard G. Newell and Karen Palmer. 2009. *Energy Efficiency Economics and Policy*. *Annual Review of Resource Economics*

Second Part: M. Vesal (Session 11 – Session 28)

General References

Two undergraduate textbooks that are useful for the background discussion of the topics covered are:

Keohane, M. N. O., & Olmstead, S. M. (2016). *Markets and the Environment*. Island Press.

Harris, J. M., & Roach, B. (2017). *Environmental and natural resource economics: A contemporary approach*. Routledge.

We use chapters from the following handbooks as well:

Handbook of Environmental Economics, Volumes 1 (2003), 2 (2005), 3 (2005), and 4 (2018).

Handbook of Agricultural Economics, Volumes 1A, 1B (2001), 2A, 2B (2002), 3 (2007), 4 (2010).

Topic 11: Externalities from resource extraction and use

Air pollution and health

Chay, Kenneth Y. and Michael Greenstone, "The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession", *Quarterly Journal of Economics* (2003), 1121-1167.

Chen, Yuyu, Avraham Ebenstein, Michael Greenstone, and Hongbin Li (2013). Evidence on the Impact of Sustained Exposure to Air Pollution on Life Expectancy from China's Huai River Policy.

Currie, Janet, and Matthew Neidell, "Air Pollution and Infant Health: What Can We Learn from California's Recent Experience?", *Quarterly Journal of Economics* 120 (2005)

Currie, Janet and Reed Walker (2011). "Traffic Congestion and Infant Health: Evidence from E-Z Pass". *American Economic Journal: Applied Economics*.

Water pollution and health

Galiani, Sebastian, Paul Gertler, and Ernesto Schargrodsy. "Water for life: The impact of the privatization of water services on child mortality." *Journal of political economy* 113.1 (2005): 83-120.

Zivin, Joshua Graff, Matthew Neidell, and Wolfram Schlenker. "Water quality violations and avoidance behavior: Evidence from bottled water consumption." *American Economic Review* 101.3 (2011): 448-53.

Farrow, R. Scott, et al. "Pollution trading in water quality limited areas: Use of benefits assessment and cost-effective trading ratios." *Land Economics* 81.2 (2005): 191-205.

Climate change and agriculture

Deschenes, Olivier, and Michael Greenstone. "The economic impacts of climate change: evidence from agricultural output and random fluctuations in weather." *The American Economic Review* 97.1 (2007): 354-385.

Fisher, Anthony C., et al. "The economic impacts of climate change: evidence from agricultural output and random fluctuations in weather: comment." *The American Economic Review* 102.7 (2012): 3749-3760.

Schlenker, Wolfram, W. Michael Hanemann, and Anthony C. Fisher. "Will US agriculture really benefit from global warming? Accounting for irrigation in the hedonic approach." *The American Economic Review* 95.1 (2005): 395-406.

Topic 12: Environmental regulation

Market-based regulation: taxes, subsidies, emission markets, PES

Banzhaf, Spencer H., and Randall P. Walsh. "Do people vote with their feet? An empirical test of Tiebout's mechanism." *The American Economic Review* 98.3 (2008): 843-863.

Fowlie, M., Holland, S. P., and Mansur, E. T., 2012. "What Do Emissions Markets Deliver and to Whom? Evidence from Southern California's NO_x Trading Program." *American Economic Review*, 102(2): 965–93

Fowlie, M. (2010). "Emissions Trading, Electricity Restructuring, and Investment in Pollution Abatement." *The American Economic Review*, 100:837–869.

Levinson, A. (1999). State taxes and interstate hazardous waste shipments. *American Economic Review*, 89(3), 666-677.

Sims, K.R.E., and J.M. Alix-Garcia. 2016. "Parks versus PES: Evaluating direct and incentive-based land conservation in Mexico." *Journal of Environmental Economics and Management*.

Non-market regulation: fuel economy standards, fuel regulation

Olmstead, Sheila M., and Robert N. Stavins. 2009. "Comparing Price and Nonprice Approaches to Urban Water Conservation." *Water Resources Research* 45 (4)

Ferraro, Paul J., and Michael K. Price. "Using nonpecuniary strategies to influence behavior: evidence from a large-scale field experiment." *Review of Economics and Statistics* 95.1 (2013): 64-73.

Mansur, Erin T., and Sheila M. Olmstead. "The value of scarce water: Measuring the inefficiency of municipal regulations." *Journal of Urban Economics* 71.3 (2012): 332-346.

Cost of environmental regulation

Greenstone, M., 2002. "The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures." *Journal of Political Economy* 110: 1175-1219

Ryan, Stephen P. "The costs of environmental regulation in a concentrated industry." *Econometrica* 80.3 (2012): 1019-1061

Topic 13: R & D and innovation in energy industry

Newell, R., Jaffe, A., Stavins, R. (1999). "The induced innovation hypothesis and energy-saving technological change". *The Quarterly Journal of Economics* 114 (3), 41-975.

Popp, D. (2002). "Induced innovation and energy prices". *American Economic Review* 92 (1), 160-180.

Popp, David, Richard Newell and Adam Jaffe, 2010. "Energy, the environment, and technological change," in Hall, Bronwyn H. and Nathan Rosenberg, eds., *Handbook of the Economics of Innovation*, North Holland,

Rose, N., Joskow, P. (1990). "The diffusion of new technologies: Evidence from the electric utility industry". *Rand Journal of Economics* 21, 354-373.

Topic 14: Valuation of environmental resources

Revealed-preference approach

- Bockstael, N. E., & Freeman III, A. M. (2005). Welfare theory and valuation. *Handbook of environmental economics*, 2, 517-570.
- Palmquist, R. B. (2005). Property value models. *Handbook of environmental economics*, 2, 763-819.
- Kuminoff, N. V., Parmeter, C. F., & Pope, J. C. (2010). Which hedonic models can we trust to recover the marginal willingness to pay for environmental amenities?. *Journal of environmental economics and management*, 60(3), 145-160.
- Kahn, M. E. (1995). A Revealed Preference Approach to Ranking City Quality of Life. *Journal of Urban Economics*, 38(2), 221-235.
- Klaiber, H. A., & Phaneuf, D. J. (2010). Valuing open space in a residential sorting model of the Twin Cities. *Journal of Environmental Economics and Management*, 60(2), 57-77.
- Greenstone, M., & Gallagher, J. (2008). Does hazardous waste matter? Evidence from the housing market and the superfund program. *The Quarterly Journal of Economics*, 123(3), 951-1003.
- Flores, N. 2002. "Conceptual framework for non-market valuation", Ch. 2 in "A primer on non-market valuation" Eds. Champ, Boyle & Brown
- Pattanayak, S.K., and D.T. Butry. 2005. "Spatial Complementarity of Forests and Farms: Accounting for Ecosystem Services." *American Journal of Agricultural Economics* 87(4):995–1008.
- Vincent, J.R., I. Ahmad, N. Adnan, W.B. Burwell, I.I.I. S.K. Pattanayak, and J.T.K. Thomas. 2016. "Valuing Water Purification by Forests: An Analysis of Malaysian Panel Data." *Environmental and Resource Economics* 64:59–80.

Stated-preference approach (contingent valuation)

- Carson, R. T., & Hanemann, W. M. (2005). Contingent valuation. *Handbook of environmental economics*, 2, 821-936.

Topic 15: Agriculture and environment

- Emerick, Kyle, et al. "Technological innovations, downside risk, and the modernization of agriculture." *American Economic Review* 106.6 (2016): 1537-61.
- Kirwan, Barrett E. "The incidence of US agricultural subsidies on farmland rental rates." *Journal of Political Economy* 117.1 (2009): 138-164.
- Johnson, D. Gale. "Agriculture and the Wealth of Nations." *The American economic review* 87.2 (1997): 1-12.

Topic 16: Macroeconomics and environment

- Heal, G., & Kristrom, B. (2005). Chapter 22 in *National Income and the Environment: Handbook of Environmental Economics*. Vol. 3.
- Xepapadeas, A. (2005). Economic growth and the environment. Chapter 23 in *Handbook of Environmental Economics*, vol. 3, 1219-1271, ed. by K.-G. Mäler and JR Vincent.
- Dell, M., Jones, B. F., & Olken, B. A. (2009). Temperature and income: reconciling new cross-sectional and panel estimates. *American Economic Review*, 99(2), 198-204.
- Dell, M., Jones, B. F., & Olken, B. A. (2012). Temperature shocks and economic growth: Evidence from the last half century. *American Economic Journal: Macroeconomics*, 4(3), 66-95.

Barreca, A., Clay, K., Deschênes, O., Greenstone, M., & Shapiro, J. S. (2015). Convergence in adaptation to climate change: Evidence from high temperatures and mortality, 1900-2004. *American Economic Review*, *105*(5), 247-51.