

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 any resources to spend for infrastructure, health and education. Additionally, about half of government income is funded by oil revenue in which it seems that 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 is actually empirical energy economics and part of sequences will be presented in the near future. Advanced econometrics methods will be discussed in the course and homework are based on actual data and replication of recent papers in top journals. I advise you to take the course “Industrial Organization” and “Applied Econometrics. You have to referee two job market papers. The Two referee reports are due as indicated in the schedule . Two papers are:

1. Compiani, Giovanni, Philip Haile, and Marcelo Sant’Anna. Common Values, Unobserved Heterogeneity, and Endogenous Entry in US Offshore Oil Lease Auctions. working paper, 2017.
2. Bruegge, Chris. Distortionary Fundraising for Energy Efficiency Subsidies: Implications for Efficient and Equitable Program Design. Working Paper, 2017.(last year job market from Stanford)

In addition, there will be four homework 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 economics. I suggest you to pick a topic and reading all papers under the topic in the reading list. At the end of class I will ask one student to discuss the reading paper for the class. If you are absent you will miss the grade of the paper, if you are present in the class but not reading the paper beforehand, you will get half mark. The reading paper is marked with ❖. You need to answer these question 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 you discussion.

There will be a research proposal that I will discuss during the classes: So, the grading is as follows:

Two referee reports (2 grades)

Four homework (2 grades)

Class presence (2 grades)

One midterm (4 grades)

Final (6 grades)
Research proposal (4 grades)

Syllabus:

Class 1: Hotelling model, 1397/6/26

- 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 Economt*, 2018
- ❖ Miller, Merton H., and Charles W. Upton. "A test of the Hotelling valuation principle." *Journal of Political Economy* 93.1 (1985): 1-25.

Class 2: Ordering of extraction, 1397/6/31

- Chakravorty, U., J. Roumasset, and K. Tse. "Endogenous Substitution among Energy Resources and Global Warming", *Journal of Political Economy*, 105 (6), December, 1201-34.
- Chakravorty, Ujjayant, Michel Moreaux, and Mabel Tidball. "Ordering the extraction of polluting nonrenewable resources." *The American Economic Review* 98.3 (2008): 1128-1144.
- ❖ Covert, Thomas, Michael Greenstone, and Christopher R. Knittel. "Will we ever stop using fossil fuels?." *Journal of Economic Perspectives* 30.1 (2016): 117-38.

Class 3: Drilling economy, 1397/7/2

- 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).

Class -: Oil Transportation, 1397/7/7

- ❖ Covert, Thomas R., and Ryan Kellogg. "Crude by rail, option value, and pipeline investment". No. w23855. National Bureau of Economic Research, 2017..
- ❖ McRae, Shaun. *Crude Oil Price Differentials and Pipeline Infrastructure*. No. w24170. National Bureau of Economic Research, 2017.

Class 4: Dutch disease, 1397/7/9

- Matsen, Egil, and Ragnar Torvik. "Optimal dutch disease." *Journal of Development Economics* 78.2 (2005): 494-515.
- Allcott, Hunt, and Daniel Keniston. "Dutch disease or agglomeration? The local economic effects of natural resource booms in modern America." *The Review of Economic Studies* 85.2 (2017): 695-731.
- ❖ Ismail, Kareem. "The Structural Manifestation of the 'Dutch Disease': The Case of Oil Exporting Countries." *IMF Working Papers* (2010): 1-36.

Class 5: OPEC, 1397/7/14

- Asker, John, Allan Collard-Wexler, and Jan De Loecker. "(Mis) Allocation, Market Power and Global Oil Extraction." (2018).
- Smith, J. L. "Inscrutable OPEC? Behavioral tests of the cartel hypothesis." *Energy Journal* 26.1 (2005): 51-82.
- ❖ Lippi, Francesco, and Andrea Nobili. "Oil and the macroeconomy: a quantitative structural analysis." *Journal of the European Economic Association* 10.5 (2012): 1059-1083

Class 6: Oil price, 1397/7/16

- Baumeister, Christiane, and Lutz Kilian. "Forty years of oil price fluctuations: Why the price of oil may still surprise us." *The Journal of Economic Perspectives* 30.1 (2016): 139-160.
- Kilian, Lutz. "Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market." *American Economic Review* 99.3 (2009): 1053-69
- Baumeister, Christiane, and Lutz Kilian. *Forecasting the real price of oil in a changing world: A forecast combination approach*. Centre for Economic Policy Research, 2013
- ❖ Baumeister, Christiane, and Gert Peersman. "Time-varying effects of oil supply shocks on the US economy." *American Economic Journal: Macroeconomics* 5.4 (2013): 1-28.

Class -: Oil upstream contract, 1395/12/10

- Hampson, Philip, John Parsons, and Charles Blitzer. "A case study in the design of an optimal production sharing rule for a petroleum exploration venture." *Journal of financial economics* 30.1 (1991): 45-67.
- Feng, Zhuo, Shui-Bo Zhang, and Ying Gao. "On oil investment and production: A comparison of production sharing contracts and buyback contracts." *Energy Economics* 42 (2014): 395-402.
- ❖ Ghandi, Abbas, and C-Y. Cynthia Lin. "Do Iran's buy-back service contracts lead to optimal production? The case of Soroosh and Nowrooz." *Energy Policy* 42 (2012): 181-190

Class -: Expropriation, 1395/12/15

- Stroebe, Johannes, and Arthur Van Benthem. "Resource extraction contracts under threat of expropriation: Theory and evidence." *Review of Economics and Statistics* 95.5 (2013): 1622-1639
- ❖ Guriev, Sergei, Anton Kolotilin, and Konstantin Sonin. "Determinants of nationalization in the oil sector: A theory and evidence from panel data." *Journal of Law, Economics, and Organization* 27.2 (2011): 301-323.

Class 7: Lease auctions, 1397/7/21. Due homework 1

- 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

Class 8: Natural Gas, 1397/7/23

- 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.
- ❖ 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).

Class 9: Electricity Competition, 1397/7/28, Due homework 2

- Iran structure market, lecture note
- 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

Class 10: Electricity market, 1397/7/30, Due referee report 1

- 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.
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- ❖ Puller, Steven L. "Pricing and firm conduct in California's deregulated electricity market." *The Review of Economics and Statistics* 89.1 (2007): 75-87

Class 11: Electricity supply, 1397/8/5

- 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.

Class 12: Electricity demand, 1397/8/7

- Reiss, Peter C., and Matthew W. White. "Household electricity demand, revisited." *The Review of Economic Studies* 72.3 (2005): 853-883
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- ❖ 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.

Class 12: Midterm Exam, 1397/8/12

Class 13: Subsidy, 1397/8/14

- McRae, Shaun. "Infrastructure Quality and the Subsidy Trap." *The American Economic Review* 105.1 (2014): 35-66.
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- ❖ Lau, Lawrence J., Yingyi Qian, and Gerard Roland. "Reform without losers: an interpretation of China's dual-track approach to transition." *Journal of Political Economy* 108.1 (2000): 120-143.

Class 14: Gasoline supply, 1397/8/19

- 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.
- ❖ Borenstein, Severin, James Bushnell, and Matthew Lewis. "Market Power in California's Gasoline Market." *Energy Economics* 13.3 (2004): 203-210

Class 15: Gasoline demand, 1397/8/21

- Levin, Laurence, Matthew S. Lewis, and Frank A. Wolak. High frequency evidence on the demand for gasoline. Working paper, Ohio State University, 2009
- Rahmati, Tavakoli, Vesal, "What One Hundred Million Transactions Tell Us about Gasoline Elasticity of Demand", 2018
- ❖ Gillingham, Kenneth. "Selection on anticipated driving and the consumer response to changing gasoline prices." Working Paper, Yale University, School of Forestry & Environmental Studies (2012)

Class 16: Gasoline policy, 1397/8/26, Due homework 3

- Bento, Antonio M., et al. "Distributional and efficiency impacts of increased US gasoline taxes." *The American Economic Review* (2009): 667-699.
- ❖ Anderson, Michael L., and Maximilian Auffhammer. "Pounds that kill: the external costs of vehicle weight." *The Review of Economic Studies* 81.2 (2014): 535-571

Class 17: Gasoline price, 1397/8/28

- Anderson, Soren T., et al. "Forecasting gasoline prices using consumer surveys." *The American Economic Review* 101.3 (2011): 110-114.

- Allcott, Hunt. "Consumers' perceptions and misperceptions of energy costs." *The American Economic Review* 101.3 (2011): 98-104.
- Gicheva, Dora, Justine Hastings, and Sofia Villas-Boas. "Investigating Income Effects in Scanner Data: Do Gasoline Prices Affect Grocery Purchases?." *The American Economic Review* 100.2 (2010): 480-484.
- ❖ Borenstein, Severin, A. Colin Cameron, and Richard Gilbert. "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?." *The Quarterly Journal of Economics* 112.1 (1997): 305-339.

No class on 1397/09/03

Class 18: Efficiency, 1397/09/05, Due referee report 2

- 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*

Class 19: Pollution and Health, 1397/09/10

- 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*,

Class 20: Emission and market, 1397/09/12

- 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 NOx 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.

Class 21: Environment, regulation, welfare, 1397/09/17

- 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

Class 22: Water and regulation, 1397/09/19

- Renwick, Mary E., and Richard D. Green. "Do residential water demand side management policies measure up? An analysis of eight California water agencies." *Journal of Environmental Economics and Management* 40.1 (2000): 37-55.
- ❖ 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.

Class 23: Water and health, 1397/09/24

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

Class 24:, Agriculture economics, 1397/09/26

- 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.

Class 25: Agriculture and climate change 1397/10/01, Due homework 4

- 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.

Class 26: Renewable Energy, 1397/10/03

- Joskow, Paul L. "Comparing the costs of intermittent and dispatchable electricity generating technologies." *American Economic Review* 101.3 (2011): 238-41.
- Gowrisankaran, Gautam, Stanley S. Reynolds, and Mario Samano. "Intermittency and the value of renewable energy." *Journal of Political Economy* 124.4 (2016): 1187-1234.
- ❖ Borenstein, Severin. "The private and public economics of renewable electricity generation." *Journal of Economic Perspectives* 26.1 (2012): 67-92.

Class -: Solar Electricity

- Lee, Kenneth, Edward Miguel, and Catherine Wolfram. "Appliance ownership and aspirations among electric grid and home solar households in rural Kenya." *American Economic Review* 106.5 (2016): 89-94.
- ❖

Class -: R&R 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.

Class 27: Nuclear Energy, 1397/10/08

- Lucas Davis and Catherine Hausman, "Market Impacts of a Nuclear Power Plant Closure", *AEJ: Applied Economics*, 2016
- Davis, Lucas W. and Catherine D. Wolfram. 2012. "Deregulation, Consolidation and Efficiency: Evidence from U.S. Nuclear Power," *American Economic Journal: Applied Economics*, 2012, 4(4), 194-225
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Research proposal due date is 1397/10/30