

Economics 627 (L01) Energy Economics

Instructor: Lucija Muehlenbachs
Email: lmuehlen@ucalgary.ca

Lecture Location: ZOOM Delivery
Lecture Days/Time: TR 12:30 - 13:45

Office: ZOOM Delivery
Office Hours: R 15:00 – 16:00

Winter 2021

Course Description:

Applies the tools of microeconomics, institutional economics, and econometrics to energy markets and policies. Focuses on empirical studies of the energy business including markets for natural gas, crude oil, gasoline, and electricity.

Course Outcomes:

The objective of this course is to provide the economist's perspective on a broad range of topics surrounding energy supply and demand. Course goals are to understand: how markets work; the consequences of environmental externalities and other market failures; and how the characteristics of markets impact effective policy. Topics include: pricing non-renewable resources, transportation policies, and electricity markets.

Course Outline:

Upstream oil and gas

Jennifer Winter, "Buying Anonymity: An Investigation of Petroleum and Natural Gas Lease Auctions"

Newell, Richard G., Brian C. Prest, and Ashley B. Vissing. "Trophy Hunting versus Manufacturing Energy: The Price Responsiveness of Shale Gas." *Journal of the Association of Environmental and Resource Economists* 6, no. 2 (2019): 391-431.

Nordhaus, William D. "The economics of an integrated world oil market." In *International Energy Workshop*, pp. 17-19. 2009.

Anderson, Soren, Ryan Kellogg, and Steve Salant, "Hotelling Under Pressure," *Journal of Political Economy*.

Baumeister, Christiane, and Lutz Kilian. "40 Years of Oil Price Fluctuations: Why the Price of Oil May Still Surprise Us." *Journal of Economic Perspectives*, 2016.

Kilian, Lutz. "Oil Price Shocks: Causes and Consequences." *Annu. Rev. Resour. Econ.* 6, no. 1 (2014): 133-154.

Newell, Richard and Brian C. Prest, "Informing SPR Policy through Oil Futures and Inventory Dynamics" RFF Discussion Paper

Jacobsen, Grant D. and Dominic P. Parker "The Economic Aftermath of Resource Booms: Evidence from Boomtowns in the American West" *Economic Journal* (2014)

Feyrer, James, Erin T. Mansur and Bruce Sacerdote. 2017. "Geographic Dispersion of Economic Shocks: Evidence from the Fracking Revolution." *American Economic Review*, 107(4):1313-34.

Beine, Michel, Serge Coulombe, and Wessel N. Vermeulen. "Dutch disease and the mitigation effect of migration: evidence from Canadian provinces." *The Economic Journal* 125, no. 589 (2015): 1574-1615.

Allcott, Hunt and Daniel Keniston, "Dutch Disease or Agglomeration? The Local Economic Effects of Natural Resource Booms in Modern America"

Environmental regulation of oil and gas extraction

Lade, Gabriel, and Ivan Rudik, "Costs of Inefficient Regulation: Evidence from the Bakken," Working Paper

Muehlenbachs, L., "A Dynamic Model of Cleanup: Estimating Sunk Costs in Oil and Gas Production," *International Economic Review* (2015)

Muehlenbachs, L., E. Spiller, and C. Timmins, "The Housing Market Impacts of Shale Gas Development," *American Economic Review*, 2015.

Mason, Charles, Lucija Muehlenbachs, and Sheila M. Olmstead "The Economics of Shale Gas Development," *Annual Review of Resource Economics*, 2015.

Refining

"Canada's first refinery in 30 years could rescue battered oil producers," Financial Post, December 25, 2017

"'Sport to make fun of': New refinery in Alberta eager to prove the doubters wrong," Financial Post, October 19, 2017

Tombe, Trevor. "Better Off Dead: 'Value Added' in Economic Policy Debates." (2015), SPP Research Paper.

Muehlegger, Erich, and Richard L. Sweeney. "Pass-Through of Input Cost Shocks Under Imperfect Competition: Evidence from the US Fracking Boom." No. w24025. National Bureau of Economic Research, 2017

Borenstein, Severin, and Ryan Kellogg. "The Incidence of an Oil Glut: Who Benefits from Cheap Crude Oil in the Midwest?" *The Energy Journal* 35, no. 1 (2014).

McRae, Shaun, "Vertical Integration and Price Differentials in the U.S. Crude Oil Market," 2015

Oil, gas, coal transport—Pipelines and rail

McRae, Shaun, "Crude Oil Price Differentials and Pipeline Infrastructure," NBER Working Paper No. 24170. 2017.

National Energy Board "Canada's Pipeline Transportation System 2016"

Clay, Karen, Akshaya Jha, Nicholas Muller, and Randall Walsh "The External Costs of Transporting Petroleum Products by Pipelines and Rail: Evidence from Shipments of Crude Oil from North Dakota" NBER Working Paper No. 23852 September 2017

Covert, Thomas and Ryan Kellogg "Crude by Rail, Option Value, and Pipeline Investment," NBER Working Paper No. 23855 September 2017

Preonas, Louis, "Market Power in Coal Shipping and Implications for U.S. Climate Policy," 2019 working paper

Gasoline

Wang, Zhongmin. "(Mixed) strategy in oligopoly pricing: evidence from gasoline price cycles before and under a timing regulation." *Journal of Political Economy* 117, no. 6 (2009): 987-1030.

Justin Marion and Erich Muehlegger, "Measuring Illegal Activity and the Effects of Regulatory Innovation: Tax Evasion and the Dyeing of Untaxed Diesel" *Journal of Political Economy*, 2014

Byrne, David P., and Nicolas De Roos. "Learning to coordinate: A study in retail gasoline." (2017).

Eckert, Andrew, and Douglas S. West. "Retail gasoline price cycles across spatially dispersed gasoline stations." *The Journal of Law and Economics* 47, no. 1 (2004): 245-273.

Eckert, Andrew. "Empirical studies of gasoline retailing: A guide to the literature." *Journal of Economic Surveys* 27, no. 1 (2013): 140-166.

Borenstein, S., Cameron, C., and Gilbert, R. (1997) "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?" *Quarterly Journal of Economics*, vol.112, 305-339.

Anderson, S., R. Kellogg, J. Sallee "What do consumers believe about future gasoline prices?" *Journal of Environmental Economics and Management*

OPEC

Asker, John, Allan Collard-Wexler, and Jan De Loecker. "Market Power and Production (Mis) Allocation. A Study of the World Oil Market." mimeo, 2017.

Viscusi, Harrington, and Vernon (2005), *Economics of Regulation and Antitrust*, Ch. 5, "Oligopoly, Collusion, and Antitrust"

Fattouh, Bassam, and Lavan Mahadeva. "OPEC: What Difference Has It Made?" *Annu. Rev. Resour. Econ.* 5, no. 1 (2013): 427-443.

Bornstein, Gideon, Per Krusell, and Sergio Rebelo. *Lags, Costs, and Shocks: An Equilibrium Model of the Oil Industry*. No. w23423. NBER, 2017.

Smith, James L. "Inscrutable OPEC? Behavioral Tests of the Cartel Hypothesis." *The Energy Journal* 26, no. 1 (2005).

Victor, David G. "National Oil Companies and the Future of the Oil Industry," *Annu. Rev. Resour. Econ.* 5, no. 1 (2013): 445-462.

Natural gas 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, no. 2 (2011): 212-241.

Muehlegger, Erich; Davis, Lucas W "Do Americans consume too little natural gas? An empirical test of marginal cost pricing" *The RAND Journal of Economics* 2010

Maximilian Auffhammer and Edward Rubin, "Natural Gas Price Elasticities and Optimal Cost Recovery Under Consumer Heterogeneity: Evidence from 300 million natural gas bills," 2018 NBER Working Paper Chapters 11 and 12 of *Economics of Regulation and Antitrust* by W. Kip Viscusi, Joseph E., Jr. Harrington, and John M. Vernon

Borenstein and Davis (2011) "The Equity and Efficiency of Two-Part Tariffs in U.S. Natural Gas Markets" *Journal of Law and Economics*

Transportation

Li, Shanjun, "Better Lucky Than Rich? Welfare Analysis of Automobile License Allocations in Beijing and Shanghai," *Review of Economic Studies*, forthcoming.

Anderson, Soren T. and James M. Sallee, "Using Loopholes to Reveal the Marginal Cost of Regulation: The Case of Fuel Economy Standards," *American Economic Review*, (2011).

Allcott, Hunt, and Nathan Wozny. "Gasoline prices, fuel economy, and the energy paradox." *Review of Economics and Statistics* 96, no. 5 (2014): 779-795.

Anderson, Soren, and James Sallee, "Designing Policies to Make Cars Greener," *Annual Review of Resource Economics*, 2016

Knittel, Christopher R., "Reducing Petroleum Consumption from Transportation," *Journal of Economic Perspectives*, (2012)

Electricity Demand

Holland, Stephen P., Erin Mansur, Nicholas Z. Muller, and Andrew J. Yates "Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors" *American Economic Review*, Volume 106, Issue 12, December 2016, Pages 3700–3729.

Ito, Koichiro. Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing (2014) *American Economic Review*

Shaffer, Blake. "Misunderstanding nonlinear prices: Evidence from a natural experiment on residential electricity demand." *American Economic Journal: Economic Policy* 12, no. 3 (2020): 433-61.

Holland, S. P. and Mansur, E. T. (2008). Is Real-Time Pricing Green? The Environmental Impacts of Electricity Demand Variance. *The Review of Economics and Statistics*, 90(3):550-561.

McRae, Shaun "Efficiency and Equity Effects of Electricity Metering: Evidence from Colombia," Working Paper

Joshua S. Graff Zivin, Matthew J. Kotchen, and Erin T. Mansur Spatial and temporal heterogeneity of marginal emissions: Implications for electric cars and other electricity-shifting policies, *Journal of Economic Behavior & Organization* 2014

Kahn, Matthew and Erin Mansur. "Do Local Energy Prices and Regulation Affect the Geographic Concentration of Employment? A Border Pairs Approach". Working Paper. 2011.

Xing, Jianwei, Benjamin Leard, and Shanjun Li. *What does an electric vehicle replace?*. No. w25771. National Bureau of Economic Research, 2019.

Electricity Supply

Borenstein, Severin, James Bushnell, and Frank Wolak. 2002. "Measuring Market Inefficiencies in California's Restructured Wholesale Electricity Market," *American Economic Review*, 92(5): 1376-1405

Bushnell, J., H. Chong and E. Mansur, "Profiting from Regulation: An Event Study of the EU Carbon Market," *American Economic Journal: Economic Policy*.

Borenstein, Severin. 2002. "The Trouble with Electricity Markets: Understanding California's Restructuring Disaster," *Journal of Economic Perspectives*.

David P. Brown Derek E. H. Olmstead, "Measuring market power and the efficiency of Alberta's restructured electricity market: An energy-only market design," *Canadian Journal of Economics*

Bushnell, James, Erin Mansur and Celeste Saravia. 2008. "Vertical Arrangements, Market Structure, and Competition: An Analysis of Restructured U.S. Electricity Markets," *American Economic Review*.

Linn, Joshua, and Lucija Muehlenbachs. "The Heterogeneous Impacts of Low Natural Gas Prices on Consumers and the Environment." *Journal of Environmental Economics and Management*.

Tabari, M. and Shaffer, B., 2020. Paying for performance: The role of policy in energy storage deployment. *Energy Economics*, 92, p.104949.

Electricity Supply in Developing Country Context

Fiona Burlig and Louis Preonas, "Out of the Darkness and Into the Light? Development Effects of Rural Electrification," Working Paper 2016.

Allcott, Hunt, Allan Collard-Wexler, Stephen D. O'Connell "How Do Electricity Shortages Affect Industry? Evidence from India" forthcoming, *American Economic Review*

Khanna, S. and Rowe, K., 2020. The Long-Run Value of Electricity Reliability in India.

Energy Efficiency

Davis, Fuchs, Gertler, Cash for Coolers: Evaluating a Large-Scale Appliance Replacement Program in Mexico, *American Economic Journal: Economic Policy*, 2014

Burlig, F., Knittel, C., Rapson, D., Reguant, M. and Wolfram, C., 2020. Machine learning from schools about energy efficiency. *Journal of the Association of Environmental and Resource Economists*, 7(6), pp.1181-1217.

Davis, Lucas. 2008. Durable Goods and Residential Demand for Energy and Water: Evidence from a Field Trial, *RAND Journal of Economics*, 39(2), 530-546.

Allcott, Hunt and Michael Greenstone. 2011. "Is There an Energy Efficiency Gap?" *Journal of Economic Perspectives*

Gillingham, Kenneth, Amelia Keyes, and Karen Palmer. "Advances in evaluating energy efficiency policies and programs." *Annual Review of Resource Economics* 10 (2018): 511-532.

Kenneth Gillingham, Matthew J. Kotchen, David S. Rapson, and Gernot Wagner (2013). "The rebound effect is overplayed" *Nature* 493, 475-476 (24 January).

Gillingham, Kenneth, Richard G. Newell and Karen Palmer. 2009. "Energy Efficiency Economics and Policy." *Annual Review of Resource Economics*, In Press.

Solar

Gerarden, T., 2017. *Demanding innovation: The impact of consumer subsidies on solar panel production costs* (pp. 0-56). Technical report, Working paper, Harvard University.

Langer, A. and Lemoine, D., 2018. *Designing dynamic subsidies to spur adoption of new technologies* (No. w24310). National Bureau of Economic Research.

De Groote, O. and Verboven, F., 2019. Subsidies and time discounting in new technology adoption: Evidence from solar photovoltaic systems. *American Economic Review*, 109(6), pp.2137-72.

Hughes, Jonathan E., and Molly Podolefsky. "Getting green with solar subsidies: evidence from the California solar initiative." *Journal of the Association of Environmental and Resource Economists* 2, no. 2 (2015): 235-275.

Innovation

Popp, D., Pless, J., Haščič, I. and Johnstone, N., 2020. *Innovation and Entrepreneurship in the Energy Sector* (No. w27145). National Bureau of Economic Research.

Prerequisites/corequisites:

None

Required Textbook(s):

There is no required textbook for this course. Required course readings are journal articles and will be made available via D2L.

Online Delivery:

This course will be delivered online. Students are expected to be able to participate online in accordance with this Course Outline. Lectures, assignments, office hours, exams, readings and other course material, etc. all require online access and this access is the responsibility of the student. The instructor will make an effort to provide reasonable accommodations and flexibility as circumstances require. Students are expected to raise with the instructor at the beginning of the semester any potential concerns that require such accommodations.

In order to remotely participate in online courses, students will need to have: computer with a current and updated operating system (macOS or Windows will work with all university-supported online learning technologies), a current and updated web browser installed – the latest versions of Firefox, Safari, Chrome or Edge will help to avoid compatibility issues, secure and reliable internet, microphone / headphones, webcam (optional), scanner (or camera to scan your work).

Desire2Learn:

This course will make use of the Desire2Learn (D2L) platform. Students who are registered in the course can log on at <http://d2l.ucalgary.ca> through their student centre. Please note that D2L features a class e-mail list that may be used to distribute course-related information. These e-mails go to your University of Calgary e-mail addresses only.

Lectures:

Lectures will be delivered online at the Registrar scheduled times and delivered using ZOOM. The lectures will be recorded and subsequently posted to D2L.

Grade Determination/Assessment:

CLASS PARTICIPATION	5%
QUIZZES	20%
QUESTIONS ON READINGS	25%
PRESENTATION OF ARTICLE	10%
EMPIRICAL PROJECT	40%
	<hr/>
	100%

5% Class participation

Class participation is determined based on attendance and engagement during student presentations.

20% Quizzes

There will be two short quizzes on material from the reading list.

25% Questions on readings

At the beginning of class on days in which papers are presented, each non-presenting student will submit a written response to pre-specified questions on each paper (~ ½ page).

10% Presentation of a journal article

Each student will give a 15-20-minute presentation (depending on class size) summarizing the findings in a recently published paper.

40% Empirical project

The goal of this assignment is to give you practice conducting research, writing, and analyzing data.

Grade Determination and Final Examination Details

Department of Economics Criteria for Letter Grades. Economics professors use the following criteria when assigning letter grades:

Grade	Grade Point Value	Description
A+	4.00	Outstanding
A	4.00	Excellent-superior performance, showing-comprehensive understanding of subject matter
A-	3.70	Very good performance
B+	3.30	Good performance
B	3.00	Satisfactory performance
B-	2.70	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	All grades below "B-" are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements. Individual programs may require a higher passing grade.

Students must receive a passing grade on the final exam to pass the course.

The exact date of the quizzes will be announced at least one week in advance. The final examination will be take-home, comprehensive, and scheduled by the Registrar. The exams will be available on D2L via D2L Quiz. At a time of the student's choosing within a 24-hour period, students will start the exam. The timer starts when the exam is started. There is no stop time. Students should plan ahead and are responsible for a reliable internet connection during the period they choose to write the exam. D2L will not let the student start the exam after the beginning of the last window within the 24-hour exam period. The exam will be open book.

Tests and exams **will not** involve multiple choice questions.

Absence from a Test/Exam

THERE WILL BE NO MAKEUP OR DEFERRED QUIZZES under any circumstances, nor may the quizzes be written early. Students unable to write the quizzes because of documented illness, family emergency, religious observance, or university-sanctioned event will have the weight shifted to the final examination; otherwise a grade of zero will be assigned. If a student cannot write their final exam on the date assigned by the Department, they need to arrange for a deferred exam with the department.

Reappraisal of Grades and Intellectual Honesty:

For reappraisal of graded term work, see Calendar I.2

<http://www.ucalgary.ca/pubs/calendar/current/i-2.html>

For reappraisal of final grade, see Calendar I.3

<http://www.ucalgary.ca/pubs/calendar/current/i-3.html>

ACADEMIC MISCONDUCT

Academic Misconduct refers to student behavior that compromises proper assessment of students' academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

Student committing academic misconduct during the final exam will not receive a passing grade on the course.

For information on the Student Academic Misconduct Policy and Procedure please visit:

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity Website at <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

Academic Accommodations:

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

Freedom of Information and Protection of Privacy (FOIP) Act:

Personal information is collected in accordance with FOIP. Assignments can only be returned to the student and will be accessible only to authorized faculty and staff. For more information, see <http://www.ucalgary.ca/legalservices/files/legalservices/faq-students.pdf> and http://www.ucalgary.ca/legalservices/files/legalservices/faq-faculty_0.pdf.

Internet and Electronic Communication Device information:

The use of cell phones for any purpose in class is prohibited. Computers and tablets may be used for note taking only unless otherwise authorized by the instructor.

Copyright Legislation:

See the University of Calgary policy on Acceptable Use of Material Protected by Copyright at www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf.

Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

Recording of Lectures:

Recording of lectures is prohibited, except for audio recordings authorized as an accommodation by SAS or an audio recording for individual private study and only with the written permission of the instructor. Any unauthorized electronic or mechanical recording of lectures, their transcription, copying, or distribution, constitutes academic misconduct. See <https://www.ucalgary.ca/pubs/calendar/current/e-6.html>.

Important Dates:

Please check: <http://www.ucalgary.ca/pubs/calendar/current/academic-schedule.html>

Student Organizations:

Faculty of Grad Studies website: <http://grad.ucalgary.ca/home>

Graduate Students Association: <http://gsa.ucalgary.ca/>

Professional Development for Grad Students

Workshops and resources can be found at <http://www.ucalgary.ca/mygradskills/>

Economics Graduate Association: <http://econ.ucalgary.ca/ega/>

Student Support and Resources:

- See <https://www.ucalgary.ca/registrar/registration/course-outlines> for information on campus mental health resources, the Student Ombuds' Office, Student Success Centre, Safewalk, and Emergency Evacuation and Assembly.
- Online writing resources are available at <https://ucalgary.ca/student-services/student-success/writing-support>.
- For registration (add/drop/swap), paying fees and assistance with your Student Centre, contact Enrolment Services at 403-210-ROCK [7625] or visit them in the MacKimmie Library Block.

Notes:

Students are responsible for all assigned material, e.g., supplementary material posted on D2L, regardless of whether or not the material was covered in class.

LM

2020-12-06