

Department of Economics
ECON 5065: Selected Topics in Economic Policy for
the Environment and Food Systems
SUMMER 2022
Tuesdays and Thursdays 18:00-20:55 Eastern Time, May 3 – June 16

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1. Course Description

The global food system plays a dominant role in shaping both the natural environment and the human disease environment. Agriculture occupies half of the earth's habitable land, and land use accounts for 24% of global greenhouse gas emissions. Livestock, which constitute 60% of the mammals alive, are reservoirs of zoonotic pathogens, from which most human communicable diseases originate. Two thirds of global antimicrobial drug use is in livestock production, contributing to eroding efficacy of drugs used to treat both veterinary and human diseases. Foodborne disease claims more lives than maternal mortality globally, while poor dietary quality is the number one risk factor for ill health, accounting for one in five deaths globally. As the world's fifth-largest agricultural exporter, Canada has a major role to play in addressing these global challenges.

Designing effective policies to manage the environmental and public health impacts of food systems requires an understanding of the underlying economics. This course introduces economic tools for the analysis and management of problems in food systems, especially as these relate to environmental quality and human health through nutrition, food safety, zoonotic disease, and antimicrobial resistance. We will discuss where markets lead to efficient outcomes and where they fail, and the role of policy in improving their function and achieving related environmental and health goals. We will survey the types of instruments that policy makers have at their disposal to reduce environmental damages and promote population health through food systems. We will cover techniques developed by economists to quantify the values of environmental services and human health and discuss how these can be used to set targets for the protection of environmental and human health. Examples will be drawn from Canada and other high-income countries as well as low and middle-income countries. Students will select topics on which to deepen their understanding through class presentations and written work.

2. Learning Goals

- Introduce the principles of public economics and the rationale for government intervention in the economy, with applications to the agri-food sector
- Equip students to interpret economic research, with a focus on the identification of causal relationships
- Develop an understanding of the economics behind national and global policy debates related to agriculture and food

3. Organization

Delivery: Online Synchronous

This is an online course conducted through Zoom. Class sessions will generally be synchronous, though depending on the preferences of the group, some lectures may be pre-recorded. Students will be expected to contribute substantively to class content and discussions based on the assigned readings as well as their own interests and expertise. Participation in class discussions will constitute an important part of student evaluation.

Brightspace

Slides, required readings, and any pre-recorded material will be posted on Carleton University's Brightspace website, as will course announcements and office hours. Assignments must be submitted through this platform. Students are responsible for regularly checking the course website to ensure that they are up to date on any announcements and have access to the documents posted. *To access this course on Brightspace, please go to <http://carleton.ca/Brightspace>.* For assistance with Brightspace contact the ITS Service Desk (4th Floor, MacOdrum Library, telephone: 613-520-3700).

Grading

Grades for this course will be assessed as follows:

Paper summary: 15% (papers selected by May 12, presentation dates vary)

- Each student will be responsible for summarizing and discussing one to two papers from the reading list in one class (some papers naturally go together and will be grouped). The presentation of the papers should take around 10 minutes, with time available for discussion after. Please upload slides for your presentation to Brightspace at least one hour ahead of class.
- For this exercise, I expect you to critically summarize the paper. This means that in addition to presenting the key findings and arguments in the paper, you will think about what the authors of the paper do well, do poorly, leave out, assume, etc. Your job is to convey to your classmates the relevance and importance of the article as well as any possible shortcomings. I strongly encourage providing some extensions to the paper in your presentation. For example, some of the papers address issues in other countries; finding and presenting data for Canada would be a great inclusion in your presentation. Alternatively, you might consider presenting the paper in conjunction with other work from a different perspective or using different data.

Take-home exam: 15% (posted at 6 pm, June 2)

- The exam will assess students' ability to describe economic concepts and methods of analysis appropriate to policy problems. This is a 24-hour take-home exam and will be based on lectures and material found in the text by Bellinger. You are expected to write this exam on your own and not discuss your responses with classmates or anyone else. You will be required to sign a statement indicating that what you have uploaded is your own work.
- Students who do not write the take-home exam because of illness or other circumstances beyond their control may apply to write a deferred midterm examination if official

documentation is provided. This documentation may be subject to verification, and as such must be accompanied by a "Consent to Release Information to a Third Party" form (available on Brightspace).

Policy brief proposal: 10% (May 19)

- A one-page description (bullet points are fine) of the problem to be addressed in the policy brief and approach to be taken for the analysis

Policy brief: 35% (June 10)

- In between 2000 and 4000 words, describe a policy problem in the food system or environment, motivate why government action is warranted, review multiple policy options, and assess the case for each of these based on published evidence. The brief should be written with a specific policymaking audience in mind. This could be a deputy minister or equivalent at the federal, provincial, or territorial level in Canada, or the equivalent senior civil servant in another country.

Presentation of policy brief: 15% (tentatively, June 7-16)

- Students will give 20-minute presentations to the class based on their briefs

Class participation: 10%

- Students will be assessed based on their contributions to class discussions

Preparation: Prepare for each lecture by reading the assigned materials in advance. The class is intended to be interactive, and your participation grade will be determined by your contribution to the discussion.

Late Assignment Policy: Assignments must be submitted by the beginning of class the day they are due via Brightspace. Extensions on assignments will be accepted only granted on medical or compassionate grounds. Students should discuss any extension request with the instructor before the submission deadline. Requests for special consideration will require proper documentation.

Re-grading Policy: Any request for regrading must be **submitted in writing** within **one week** of the exam or assignment being submitted. The request should contain a detailed explanation of why you feel you should receive a higher grade. Please note that I will regrade the entire exam or assignment and not just the contentious question. As a result, the revised grade may be higher than, lower than or the same as the original grade.

Satisfactory Performance Criteria: Students must fulfil all of the preceding course requirements in order to achieve a passing grade. Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

4. Course Outline

In the first part of the class, we will cover key economic concepts and tools for policy analysis, including the theory underlying market failures and the case for government intervention in the economy, causal inference, and cost-benefit analysis. Then, we will cover a set of topics related to how agricultural production, land use, and food markets affect human wellbeing and the environment. Each student will

select a paper analyzing one of these topics from an economic perspective to present to the class. During the final few classes, students will present their own analysis of a policy problem related to the food system or environment more generally. Active participation in class discussion will be assessed and count toward the final grade.

Lectures will draw on the readings listed below. One or two mandatory readings will typically be assigned and communicated to students in advance of each class. Students should come to class ready to discuss this material as well as the lecture notes, which will be posted at least a day in advance of class. Any materials that are not available online will be made available on Brightspace.

We will make use of the following texts throughout the class:

Bellinger, W.K., 2007. *The economic analysis of public policy*. Routledge.

<http://14.99.188.242:8080/jspui/bitstream/123456789/4034/1/The%20Economic%20Analysis.pdf>

OECD (2018), *Cost-Benefit Analysis and the Environment: Further Developments and Policy Use*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264085169-en> (as a potential supplement to Bellinger)

Searchinger, T. et al., 2018. *Creating a Sustainable Food Future*, WRI: World Resources Institute. <https://research.wri.org/wrr-food>

1. Concepts and tools for economic policy analysis

Abadie, A. 2005. "Causal Inference" in *Encyclopedia of Social Measurement, Volume 1*, Kimberly Kempf-Leonard, ed. ISBN: 978-0-12-369398-3.

Bellinger, chapters 2-8

2. Agricultural intensification

Land use

Burney, J.A., Davis, S.J. and Lobell, D.B., 2010. Greenhouse gas mitigation by agricultural intensification. *Proceedings of the national Academy of Sciences*, 107(26), pp.12052-12057.

Griscom, B.W., Adams, J., Ellis, P.W., Houghton, R.A., Lomax, G., Miteva, D.A., Schlesinger, W.H., Shoch, D., Siikamäki, J.V., Smith, P. and Woodbury, P., 2017. Natural climate solutions. *Proceedings of the National Academy of Sciences*, 114(44), pp.11645-11650.

Mueller, N.D., Gerber, J.S., Johnston, M., Ray, D.K., Ramankutty, N. and Foley, J.A., 2012. Closing yield gaps through nutrient and water management. *Nature*, 490(7419), pp.254-257.

Chemical pollution

Brainerd, E. and Menon, N., 2014. Seasonal effects of water quality: The hidden costs of the Green Revolution to infant and child health in India. *Journal of Development Economics*, 107, pp.49-64.

Frank, E., 2021. The Economic Impacts of Ecosystem Disruptions: Private and Social Costs from Substituting Biological Pest Control. Working Paper.

Closing yield gaps

- Ali, D.A., Deininger, K. and Goldstein, M., 2014. Environmental and gender impacts of land tenure regularization in Africa: Pilot evidence from Rwanda. *Journal of Development Economics*, 110, pp.262-275.
- Duflo, E., Kremer, M. and Robinson, J., 2011. Nudging farmers to use fertilizer: Theory and experimental evidence from Kenya. *American Economic Review*, 101(6), pp.2350-90.
- Emerick, K. and Dar, M.H., 2021. Farmer field days and demonstrator selection for increasing technology adoption. *Review of Economics and Statistics*, 103(4), pp.680-693.
- Seufert, V. and Ramankutty, N., 2017. Many shades of gray—The context-dependent performance of organic agriculture. *Science advances*, 3(3), p.e1602638.
- Searchinger et al. Chapters 10, Assessing the Challenge of Limiting Agricultural Land Expansion, and 17, Causes and Consequences of Agricultural Land-Shifting.

3. Policies and payments to preserve ecosystem services

- Jack, B.K. and Jayachandran, S., 2019. Self-selection into payments for ecosystem services programs. *Proceedings of the National Academy of Sciences*, 116(12), pp.5326-5333.
- Jayachandran, S., De Laat, J., Lambin, E.F., Stanton, C.Y., Audy, R. and Thomas, N.E., 2017. Cash for carbon: A randomized trial of payments for ecosystem services to reduce deforestation. *Science*, 357(6348), pp.267-273.
- Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., Swette, B., Bezerra, T., DiGiano, M., Shimada, J., Seroa da Motta, R. and Armijo, E., 2014. Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science*, 344(6188), pp.1118-1123.
- Molnar, J.L. and Kubiszewski, I., 2012. Managing natural wealth: Research and implementation of ecosystem services in the United States and Canada. *Ecosystem Services*, 2, pp.45-55.
- Salzman, J., Bennett, G., Carroll, N., Goldstein, A. and Jenkins, M., 2018. The global status and trends of Payments for Ecosystem Services. *Nature Sustainability*, 1(3), pp.136-144.
- Searchinger et al. Chapter 18, Link Productivity Gains with Protection of Natural Ecosystems.

4. Agricultural policies

- McFatrige, S., M. Moffat, S. Khalaj, R. Tougas-Cooke, J. McNally and S. Cyrus Patel, 2021. Clean growth in Canada's Agriculture and Agri-food Sector. Smart Prosperity Institute.
- Supply management
- Carter, C.A. and Mérel, P., 2015. Hidden costs of supply management in a small market. *Canadian Journal of Economics/Revue canadienne d'économique*, 49(2), pp.555-588.
- Cardwell, R., Lawley, C. and Xiang, D., 2015. Milked and feathered: The regressive welfare effects of Canada's supply management regime. *Canadian Public Policy*, 41(1), pp.1-14.
- Doyon, M., Bergeron, S. and Tamini, L.D., 2018. Milked and Feathered: the regressive welfare effects of Canada's Supply Management regime: A comment. *Canadian Public Policy*, 44(3), pp.272-277.
- Heminthavong, K. 2018. Canada's Supply Management System. Background Paper, Library of Parliament.
- Agricultural subsidies
- OECD (2021), Agricultural Policy Monitoring and Evaluation 2021: Addressing the Challenges Facing Food Systems, OECD Publishing, Paris, <https://doi.org/10.1787/2d810e01-en>.

Springmann, M. and Freund, F., 2022. Options for reforming agricultural subsidies from health, climate, and economic perspectives. *Nature Communications*, 13(1), pp.1-7.

Biofuels

Khanna, M., Rajagopal, D. and Zilberman, D., 2021. Lessons Learned from US Experience with Biofuels: Comparing the Hype with the Evidence. *Review of Environmental Economics and Policy*, 15(1), pp.67-86.

Searchinger et al. Chapter 7, Avoid Competition from Bioenergy for Food Crops and Land.

5. Carbon taxes

Andersson, J.J., 2019. Carbon taxes and CO₂ emissions: Sweden as a case study. *American Economic Journal: Economic Policy*, 11(4), pp.1-30.

Dobson, S., 2021. A primer On Carbon Tax Relief for Farmers. SPP Briefing Papers, 14(34).

Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R. and Stern, N., 2018. Making carbon pricing work for citizens. *Nature Climate Change*, 8(8), pp.669-677.

Olale, E., Yiridoe, E.K., Ochuodho, T.O. and Lantz, V., 2019. The effect of carbon tax on farm income: evidence from a Canadian province. *Environmental and Resource Economics*, 74(2), pp.605-623.

Rack, Y. "Canada's biggest emitters are paying the lowest carbon tax rate". Corporate Knights, January 17, 2022.

Slade, P., Lloyd-Smith, P. and Skolrud, T., 2020. The Effect of Carbon Tax on Farm Income: Comment. *Environmental and Resource Economics*, 77(2), pp.335-344.

Yamazaki, A., 2022. Environmental taxes and productivity: Lessons from Canadian manufacturing. *Journal of Public Economics*, 205, p.104560.

6. Zoonotic disease risk in agriculture

Animal Health Canada website: <https://animalhealthcanada.ca/work-areas/animal-health-canada>

Espinosa, R., Tago, D. and Treich, N., 2020. Infectious diseases and meat production. *Environmental and Resource Economics*, 76(4), pp.1019-1044.

Martins, S.B., Häsler, B. and Rushton, J., 2015. Economic aspects of zoonoses: impact of zoonoses on the food industry. In *Zoonoses-Infections Affecting Humans and Animals* (pp. 1107-1126). Springer, Dordrecht.

7. Antimicrobial use in food production

Caudell, Mark A., Alejandro Dorado-Garcia, Suzanne Eckford, Chris Creese, Denis K. Byarugaba, Kofi Afakye, Tamara Chansa-Kabali et al. "Towards a bottom-up understanding of antimicrobial use and resistance on the farm: A knowledge, attitudes, and practices survey across livestock systems in five African countries." *PLoS One* 15, no. 1 (2020): e0220274.

Coyne, Lucy, Ian Patrick, Riana Arief, Carolyn Benigno, Wantanee Kalpravidh, James McGrane, Luuk Schoonman, Ady Harja Sukarno, and Jonathan Rushton. The costs, benefits and human behaviours for antimicrobial use in small commercial broiler chicken systems in Indonesia. *Antibiotics* 9, no. 4 (2020): 154.

Innes, G.K., Randad, P.R., Korinek, A., Davis, M.F., Price, L.B., So, A.D. and Heaney, C.D., 2020. External societal costs of antimicrobial resistance in humans attributable to antimicrobial use in livestock. *Annual Review of Public Health*, 41, pp.141-157.

Lhermie, G., Gröhn, Y.T. and Raboisson, D., 2017. Addressing antimicrobial resistance: an overview of priority actions to prevent suboptimal antimicrobial use in food-animal production. *Frontiers in Microbiology*, 7, p.2114.

Ryan, M. (2019), "Evaluating the economic benefits and costs of antimicrobial use in food-producing animals", *OECD Food, Agriculture and Fisheries Papers*, No. 132, OECD Publishing, Paris, <https://doi.org/10.1787/f859f644-en>.

8. Food safety

Antle, J.M., 2001. Economic analysis of food safety. *Handbook of agricultural economics*, 1, pp.1083-1136.

Jaffee, S., Henson, S., Grace, D., Ambrosio, M. and Berthe, F., 2020. *Why food safety matters to Africa: Making the case for policy action*. IFPRI and AKADEMIYA2063.

Magnan, N., Hoffmann, V., Opoku, N., Garrido, G.G. and Kanyam, D.A., 2021. Information, technology, and market rewards: Incentivizing aflatoxin control in Ghana. *Journal of Development Economics*, 151, p.102620.

Hoffmann, V., Moser, C.M. and Herrman, T.J., 2021. Demand for Aflatoxin-Safe Maize in Kenya: Dynamic Response to Price and Advertising. *American Journal of Agricultural Economics*, 103(1), pp.275-295.

Hoffmann, V. and Moser, C., 2017. You get what you pay for: the link between price and food safety in Kenya. *Agricultural Economics*, 48(4), pp.449-458.

Kariuki, S.W. and V. Hoffmann. 2021. Can information drive demand for safer food? Impact of brand-specific recommendations and test results on product choice *Agricultural Economics* <https://doi.org/10.1111/agec.12685>

9. Determinants and consequences of food choice and demand

Headey, D., Hirvonen, K. and Hoddinott, J., 2018. Animal sourced foods and child stunting. *American Journal of Agricultural Economics* 100(5): 1302–1319.

Headey, D., Hirvonen, K., Hoddinott, J. and Stifel, D., 2019. Rural food markets and child nutrition. *American Journal of Agricultural Economics*. 101(5): 1311–1327; doi: 10.1093/ajae/aaz032

Kurz, V., 2018. Nudging to reduce meat consumption: Immediate and persistent effects of an intervention at a university restaurant. *Journal of Environmental Economics and management*, 90, pp.317-341.

Lieffers, J.R., Ekwaru, J.P., Ohinmaa, A. and Veugelers, P.J., 2018. The economic burden of not meeting food recommendations in Canada: The cost of doing nothing. *PLoS One*, 13(4), p.e0196333.

Searchinger et al. Chapters 6, Shift to Healthier and More Sustainable Diets and 8, Achieve Replacement-Level Fertility Rates.

Academic integrity: Please be aware that plagiarism is serious offence at Carleton and should be recognized and avoided. Definitions and policies regarding plagiarism can be found here: <https://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy-2021.pdf>

Requests for Academic Accommodation: You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website:

carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website:

carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made.

carleton.ca/pmc

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

<https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline