Universität zu Köln

Department of Economics – Chair in Economics, Energy, and Sustainability

Prof. Dr. Marc Oliver Bettzüge

Seminar in Statistics and Econometrics

Summer Term 2026

Firm Behavior under Environmental Regulation (EU ETS): A Panel Data Analysis

Allocated Modules	• 1287MESEC1 EM Seminar Economics • 1287MESEC2 SM Seminar in Statistics and Econometrics
Credits	6
Language	English
Examiner	Nada Fadl Mohamed

Seminar Topic

The European Union Emissions Trading System (EU ETS) is the world's largest greenhouse gas (GHG) emissions market, encompassing over 11,000 installations and accounting for roughly 45% of total EU emissions. While the EU ETS has achieved significant emissions reductions, it may also have adverse effects on regulated firms, particularly in terms of competitiveness and employment. These firms incur additional costs for emissions reduction or buying permits, which can result in a competitive disadvantage relative to non-regulated firms, particularly competitors operating in non-regulated countries or regions. During the EU ETS phases I and II, studies examining the ex-post impacts of the EU ETS on firms find little evidence of significant adverse effects on competitiveness. Even within energy-intensive industries, no negative firm-level competitiveness effects are identified for the cement, iron, or steel sectors. On the contrary, the power sector appears to have experienced revenue gains in spite of higher unit input costs. The EU ETS began its fourth phase period in 2021, amid the pandemic, and is set to continue until 2030 under updated regulations. As part of broader reforms, the rules for allocating emission allowances, a key aspect of the system, have been significantly revised over successive emissions trading periods.

A welfare-maximizing regulator may tax part of the gains from welfare-enhancing regulation and use the revenues to alleviate compliance costs for regulated sectors. However, this raises fundamental questions about the desirability, allocation, and size of compensation, including whether firms causing environmental harm should be compensated at all. Regulation's distributional impacts have significant implications for policy design. Specifically, without compensation for compliance costs, firms may relocate to countries with less stringent regulations, resulting in so-called "carbon leakage". Carbon leakage not only results in

job losses but also undermines the effectiveness of the regulation. Consequently, understanding the effects of the EU ETS on firms has received significant attention, as these effects can be analyzed from various aspects. Firms' productivity, profitability, competitiveness, and risk of relocation may all be affected by the system's rules across its different trading phases.

In this seminar, students will critically review the current literature that employs panel data methods to assess the effects of the EU ETS on firm behavior, with particular focus on impacts on productivity, profitability, competitiveness, and the risk of carbon leakage.

Seminar objectives

The seminar aims to provide students with a comprehensive understanding of the key econometric methods used to analyze firm-level effects of the EU ETS. Students will acquire knowledge of panel data methods commonly applied in energy and environmental economics research. By the end of the seminar, students will develop the necessary skills to conduct independent research, formulate research questions, and understand advanced econometric tools.

Schedule

16.04.2026 10:00-11:30	Introductory meeting Organizational Issues & Topic Introduction
17.04.2026 10:00-13:30	Methodological Focus: Key concepts of panel data analysis (Part 1)
28.04.2026 10:00-13:30	Methodological Focus: Key concepts of panel data analysis (Part 2)
30.04.2026 10:00-13:30	Methodological Focus: Key concepts of panel data analysis (Part 3)
30.04.2026 23:59	Deadline to **Register or Withdraw from the Examination via KLIPS**
05.05.2026 10:00-13:30	Methodological Focus: Key concepts of panel data analysis (Part 3 Cont'd) Presentation & Writing skills session
Group Meetings (with Mentor) The meeting should focus on discussing the main idea, goal, structure of the presentation, etc.	
22.06.2026 10:00	Deadline **Submission of Presentation Slides** to ILIAS
24.06.2026 10:00-13:30	Group Presentations **Mandatory**
25.06.2026 10:00-13:30	Group Presentations **Mandatory**
26.06.2026 10:00-13:30	Group Presentations **Mandatory**
31.08.2026 23:59	Deadline **Submission of Final Seminar Paper and Research Proposal**

Location: Alte Wagenfabrik, Vogelsanger Str. 321 a, 50827 Köln

Application

A maximum of 20 applicants can be admitted to the course. Please register for the seminar on KLIPS during the first registration period. After receiving a seat in the seminar, make sure to also register for the examination on KLIPS. Only those who have secured a seat in the seminar are eligible to register for the examination. Therefore, if you decide not to take the seminar, promptly deregister from the course. This allows your peers to enroll for any remaining spots before the exam registration phase ends. Once registered for the examination, your registration is binding. Students who fail to give a presentation or submit their seminar paper on time will receive a failing grade. Therefore, before registering for the course, please ensure that you can meet all requirements within the deadlines and attend the mandatory sessions.

Examination

The final grade consists of an oral and two written examination parts. To pass the examination, students are required to participate in all parts of the examination.

The final grade for this course will be a weighted average of (the quality of):

A) presentation of overall topic (51% - 10 minutes - individual grade)
B) individual seminar paper (35% - 4.000 words)
C) research proposal (14% - https://energie.uni-koeln.de/sites/energie/Ausschreibungen_Abschlussarbeiten_BA_MA/Template_BA_MA/Proposal_Template_ausfuellbar.pdf)

Participation in all examination parts and dates is mandatory in order to complete the course successfully.

Examination part A: a presentation (April – June):

This is the oral part of the examination, aimed at providing and receiving a general overview of the various aspects of the seminar theme. Students will be assigned a specific topic within the seminar's scope and placed into groups. The Chair in Energy Economics will have sole discretion over topic and group allocations. In June, students are expected to present their topics to their peers and engage in discussions. Each presentation should offer a comprehensive overview of the assigned topic, critcally analyze the current state of the literature (including relevant sources and methods), identify compelling research questions, and examine potential future developments in the field. Students must effectively structure their topic, divide the presentation components among group members, and ensure that the presentation slides are coherent and consistent. Each student is required to present for 8-10 minutes. Grading will be based on individual performance. In case of questions, a mentor will be available to help the group.

Examination part B: a seminar paper (June – August):

The aim of this part is for students to become experts in a specific topic within the empirical literature covered in this seminar. Individual seminar topics will be assigned after the group presentations in June. The Chair in Energy Economics holds the sole discretion over topic allocation. Each student will receive a seminar topic different from their presentation topic, enabling them to explore two distinct aspects of the literature, both of which fall under the overarching seminar theme. The written paper should be approximately 4,000 words, with a 10% margin above or below this word count. Students are expected to refine their paper's focus by selecting a research question, providing a comprehensive literature overview,

and conducting an in-depth critical analysis of their chosen question. Additionally, each student will have a mentor in case any questions arise when composing the seminar paper.

Examination part C: a research proposal (June – August):

The aim of this part is to submit a research proposal that may serve as a blueprint for your master's thesis. In your proposal, you should clearly define the research question and its motivation, explain who will be interested in this research and why, outline the contribution to existing literature, describe the methods and data to be used, and highlight any potential empirical or methodological challenges. Please use the template provided by the chair to write the proposal:

https://energie.uni-koeln.de/sites/energie/Ausschreibungen_Abschlussarbeiten_BA_MA/Template_BA_MA/Proposal_Template_ausfuellbar.pdf

General Requirements

The seminar is designed to prepare students for a master's thesis in the Econometric Analysis of Energy Economics. Participants are expected to independently gain in-depth insights into their topic. Therefore, **we expect students to have a solid foundation in Energy Economics and Introductory Econometrics** (i.e., have taken other courses in the Energy specialization and Introductory Econometrics) prior to enrolling in the seminar.

While the seminar topics will be distributed by the chair, students are expected to determine the main focus of their presentations and seminar paper themselves. The emphasis within the own topic as well as the draft structure of the paper, shall be discussed with the mentor at an early stage. Furthermore, students should deal critically with the contributions of other participants.

Active participation in the seminar discussion is expected. Attendance during all presentation days is therefore required. We provide a guideline for the preparation of seminar papers. This includes all design requirements:

https://energie.uni-koeln.de/de/studium/abschlussarbeiten-theses/leitfaden-fuer-wissenschaftliche-arbeiten-guide-to-writing-academic-papers

Contact Information

Content, Organization, and Mentoring	Nada Fadl Mohamed (nada.mohamed@uni-koeln.de)
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