



The Public Defense
of the Doctoral Thesis in Economics
by

Corina Haita

on

Emissions Trading Schemes: Theoretical Modeling and Behavioral Investigation

will be held on

Wednesday, January 29, 2014 at 11:00 am

in the

Monument Building, Senate room
Central European University
Nádor Street 9, Budapest

Thesis Committee:

Julius Horváth (Chair)

Andrea Canidio (Internal member)

Balász Muraközy (External member)

Ádám Szentpeteri (External member)

Ádám Szeidl (Internal member)

Advisors:

Andrzej Baniak (Advisor)

Botond Kőszegi (Associate Advisor)

Examiners:

Peter Katuščák, Assistant Professor of Economics, CERGE-EI, Prague

(External Examiner)

Adam Szeidl, Professor of Economics, Central European University, Budapest

(Internal Examiner)

The doctoral thesis is available for inspection
at the CEU Economics Department

Abstract

Emissions Trading Schemes (ETS) have become popular instruments for climate change mitigation since the ratification of the Kyoto Protocol in 1997. Their major appeal is that they require minimum of information on the side of the regulator while the efficient solution for achieving the environmental target is left in the care of market forces. This was firstly shown by the seminal paper of Montgomery (1972), who demonstrated that in a system of tradable pollution permits, market equilibrium coincides with the cost-effective solution and this is independent of how permits are initially allocated to the regulated polluters. The current thesis contributes to the literature on the functioning of the emissions markets, with a focus on the role of auctioning as a method of initial allocation of permits. In three rather independent chapters, the thesis explores the effect of various market frictions on the outcome of an ETS. Specifically, the first chapter aims at the theoretical understanding of the effectiveness of an ETS in which permits are allocated in an auction followed by a secondary market, and all the ETS-regulated firms exercise market power. Under these conditions the auction clearing price is below the secondary market price. In addition, the high emitters lose while the low emitters gain relative to the case when all firms take permits prices as given. However, if the polluters are not too different in terms of their permits needs, strategic behavior can result in a lower overall compliance cost than in the case of price-taking behavior. In the second chapter I investigate the effect of uncertainty and the role of the speculators on the compliance behavior and profits of risk-averse regulated polluters. Contrary to the policy discussion which often ignores the presence of a secondary market when permits are allocated in an auction, the model of this paper shows that when the auction takes place under uncertainty, there will always be trade in the after-market. Moreover, the model shows how firms take into account the possibility for trade when forming their bids in the auction. The model also demonstrates that, under the most realistic assumptions, the presence of the speculators adversely affects polluters' profits, despite helping the regulator raise more revenue from selling permits. The third chapter searches for the behavioral bias of the sunk-cost fallacy in a laboratory experiment, in which the alternative course of action is explicitly given and part of the initial investment can be recouped. Conditional on subjects understanding the experimental task, I find evidence of the manifestation of the bias, which, however, is independent of the size of the initial investment. Moreover, I find that the higher cognitive ability subjects are more likely to exhibit the bias. Given its design, the findings of the experiment bear implications for emissions permits trading behavior of the regulated firms who purchase permits in an auction.

Endogenous Market Power in an Emissions Trading Scheme with Auctioning

An earlier version of this paper was awarded the Best Student Paper Award at the Bratislava Economic Meeting 2012.

Revise and resubmit to Resource and Energy Economics

Chapter 1 contributes to the literature on market power in emissions permits markets, modeling an ETS in which polluters differ only with respect to their business-as-usual emissions. The polluters play a two-stage static complete information game in which their market power arises endogenously from the business-as-usual emissions. In the first stage the polluters bid in an auction for the distribution of the fixed supply of permits and in the second stage they trade these permits in a secondary market. For compliance, they can also engage in abatement activity at a quadratic cost. In equilibrium all polluters are successful in the auction, but in the secondary market the low emitters become net sellers and the high emitters are net buyers. In addition, the secondary market price is unambiguously above the auction clearing price. Consequently, the high emitters are worse off as a result of the strategic behavior. In addition, I find that the aggregate compliance cost increases in the heterogeneity of their business-as-usual emissions. However, there exists a threshold of the fixed supply of permits above which strategic behavior is compliance cost-saving for the polluters. Moreover, there are distributions of the business-as-usual emissions for which strategic behavior is compliance cost-saving for the polluters regardless of the level of the available supply of permits.

Uncertainty and Speculators in an Emissions Trading Scheme

In Chapter 2 I develop a static game theoretical model of an ETS with auctioning, aiming at understanding the effect of the speculators on the auction outcome and polluters' profits. I assume that both the polluters and the speculators are risk averse and the polluters respond idiosyncratically to a common demand shock. The auction has a uniform price sealed-bid format to which only a subset of the polluters together with all the speculators submit bids. I derive polluters' endogenous valuations for permits and I find that they bid both for use and speculative reasons. Further, I conduct both analytical and numerical comparative statics with respect to the main parameters of the model. It appears that, while all auction participants shade their bids, the presence of the speculators determines the polluters to bid closer to their true demands, thus increasing the auction clearing price towards its competitive value. At the extreme, where the speculators are risk neutral, their presence in the auction creates a trade-off between increasing regulator's revenue and hurting the profits of the auction-participating polluters.

Sunk-Cost Fallacy with Partial Reversibility: An Experimental Investigation

The research partially to this chapter was sponsored by Central European University Foundation, Budapest (CEUBPF). The theses explained herein are representing the own ideas of the author, but not necessarily reflect the opinion of CEUBPF.

Chapter 3 contributes to the literature attempting to document the sunk-cost fallacy in laboratory. I study the bias in a simple experimental setting, void of its previously acknowledged psychological roots. Under this design (i) the subjects have the possibility to partially recoup the investment in the initial course of action, (ii) the alternative course of action is made explicit and obvious and (iii) the associated returns of each course of action are deterministic. The sunk-cost fallacy hypothesis is not confirmed on the sample as a whole. However, I find evidence of its manifestation on subsamples for which I make the conjecture of having a better comprehension of the experimental task. Nevertheless, the bias appears to be independent of the size of the investment in the initial course of action. After controlling for mistakes in decisions and the effort put in the experimental task, I find that higher cognitive ability subjects are more prone to the bias. Finally, I argue that the previously acknowledged psychological drivers of the sunk-cost fallacy are not needed for the bias to manifest itself. Instead, I put forward the *realization utility* as the most likely underlying reason behind the manifestation of the sunk-cost fallacy under the current experimental design.

CURRICULUM VITAE

CORINA HAITA

email: haita_corina@ceu-budapest.edu

Academic qualifications:

- 2007-2014: PhD studies in Economics, Central European University Budapest
- 2011: Visiting Scholar, Bocconi University Milan
- 2007: MA in Economics (with merit), Central European University Budapest (2007)
- 2003: BSc in Economics, Academy of Economic Studies Bucharest

Current position:

- 2013: Post-doc researcher University of Hamburg, CliSAP Cluster of Excellence project

Past positions:

- 2012 – 2013: Visiting Researcher, International Center for Climate Governance, Venice, Italy
- 2011 – 2012: Researcher for the EU-funded project NEUJOBS – Slovak Governance Institute, Bratislava, Slovakia
- 2008 – 2010: Strategy Expert – MOL Nyrt. Budapest, Hungary
- 2007: Intern – the Economic analysis division of MOL Nyrt. Budapest, Hungary
- 2005: Sampling executive – Ipsos New Media Research Bucharest, Romania
- 2003 – 2005: Programmer – SC CSV IDM Exchange SRL Bucharest, Romania

Teaching:

- Fall 2011: Introduction to Economics (BA level), Eötvös Loránd University, Budapest
- Summer 2010: Mathematics for Economists (pre-session, MA level)
- Winter 2010: Microeconomics 2 (MA level)
- Winter 2009: Microeconomics 2 (MA level)
- Summer 2008: Mathematics for Economists (pre-session, MA level)

Prizes and grants:

- Grant for conference participation – *European Association of Environmental and Resource Economists (EAERE) (2013)*
- Dissertation write-up grant – *CEU Budapest Foundation (2013)*
- Research Grant - *CEU Budapest Foundation (2013)*
- Best Doctoral Student Paper Award – Bratislava Economic Meeting 2012, *Virtual Scientific Lab and Tatra Banka, Slovakia (2012)*
- Teaching Fellowship - *CERGE-EI, Prague (2011)*
- Travel grant for conference participation – *European Environment Agency, Copenhagen (2011)*
- Doctoral Research Support Grant – *Central European University, Budapest (2011)*
- Doctoral Fellowship, *Soros Foundation Budapest (2007-2011)*
- Master Fellowship, *Soros Foundation Budapest (2005-2007)*

Presentations:

- ESI Autumn Workshop, Jena 2013
- 20th Annual Conference of the European Association of Environmental and Resource Economists, Toulouse, June 2013
- 6th RGS Doctoral Conference in Economics, Ruhr University, February, 2013
- Bratislava Economic Meeting 2012, Bratislava, Slovakia, June 2012
- Fondazione Eni Enrico Mattei seminar, Milan, December 2011
- 18th Annual Conference of the European Association of the Environmental and Resource Economists Rome, Italy, June 2011
- 14th Annual Conference on Global Economic Analysis “Governing Global Challenges” Climate Change, Trade, Finance and Development”, Venice, Italy, June 2011
- ECORE Summer School on Market Failure and Market Design, Louvain-la-Neuve, Belgium, May 2011
- 6th biennial Czech Economic Society conference, Prague, Czech Republic, November 2010

Working papers and publications:

- *Recycling the auction revenue from Phases I and II of the EU ETS*, ICCG Studies, March 2013

- *The State of the EU Carbon Market*, ICCG Studies, February 2013
- *Being and becoming low-skilled: A comprehensive approach to studying low-skillness*. NEUJOBS Working Paper no. 4.3.1. (with Lucia Kureková and Miroslav Beblavý), February 2013
- *Demand for low and medium skilled workers across Europe: between formal qualifications and noncognitive skills*. NEUJOBS Working Paper no. 4.3.3 (with Lucia Kureková, Miroslav Beblavý and Anna-Elizabeth Thum), February 2013
- *The State of Compliance in the Kyoto Protocol*, ICCG Studies, December 2012
- *Qualifications or soft skills? Studying demand for low-skilled from job advertisements*. NEUJOBS Working Paper D. 4.3.3 (with Lucia Kureková and Miroslav Beblavý), August 2012
- Translation from English to Romanian of *The General Theory of Employment, Interest and Money* by John Maynard Keynes: *Teoria generală a ocupării forței de muncă, a dobânzii și a banilor de John Maynard Keynes*, Editura Publică, București, 2009, ISBN: 978-973-1931-02-9

Languages: Romanian (native), English (fluent), Italian (fluent), German (novice)