



Fulbright Scholar Program Visiting Scholar Application Form

1. Home Country/Country Applying from: Uruguay
2. Program: NEXUS
3. Special award name:
for Iraq/MENA S&T applicants only : Cohort Discipline: Junior or Senior Scholar :

4. Category of grant: Research

5. Title: Dr. 6. Gender: Male

7. Family name: Caffera First: Marcelo Middle: Federico

8. Country of citizenship: Uruguay

9. Country of legal residence: Uruguay

10. Do you have or are you applying for U.S. permanent residency (i.e., a green card)? No

11. Date of birth: March 07, 1972 12. Place of birth: Montevideo Uruguay

13. Current position: Associate Professor and Director Start Date: June / 2004

Other: Department Name: Economics

Institution Name: Universidad de Montevideo

Click here if independent scholar/unaffiliated (please enter your residence address)

Address: Prudencio de Pena 2440 Montevideo Uruguay 11400

Email: marcaffera@um.edu.uy

Phone: 27074461 Fax: 27074461

14. Academic credentials (degrees-list three highest degrees):

Table with 4 columns: Name of Institution, Degree, Location, and Date. Rows include University of Massachusetts (Ph.D. 06/2004), University of Massachusetts (MASTER OF SCIENCE 09/2000), and Universidad de la República (BACHELOR OF SCIENCE 08/1997).

15. Most significant professional accomplishments, honors and awards and up to three significant publications:

Professional accomplishments: -Projects selected in the last three editions of Professor Clemente Estable Fund... -Second prize, for "Effectiveness of the Enforcement of Industrial Emission Standards in Montevideo, Uruguay"... Significant publication:

16. Previous Fulbright grants: [X] No (If yes, list most recent first)

17. Project title: Not applicable for Iraq/MENA S&T applicants.

Economic Experiments for the Analysis of the Compliance Behavior of Polluters with Environmental Regulation

18. Brief summary of project statement: Not applicable for Iraq/MENA S&T applicants.

In this project we will design and conduct economic experiments to test hypotheses with respect the compliance behavior of polluting firms under different policy instruments and enforcement designs. In particular, we will test the effect of different fine structures on the ability of the regulator to induce perfect compliance under two regulatory systems: emission standards and tradable pollution permits.

PROGRAM/PROFESSIONAL INFORMATION

19. Number of months required for project: *(Not applicable for Iraq/MENA S&T applicants)*2 monthsa. Begin your project: July / 2011b. End your project: August / 201120. Major academic discipline Economics

21. Specialization(s) (list sub-fields within the academic discipline):

Environmental economics22. A. State Department Field of Study EconomicsB. Primary Specialization Microeconomic Theory

23. Professional travel and/or residence abroad during the last five years.

Country	Purpose of Activity	How Long

J Category of Sponsorship _____

24. Professional Memberships (cultural, educational and professional organizations)

Organization	Your Role	How Long
Uruguayan Ecological Economics Association	Founding member	June 2010 - Present
European Association of Environmental and Resourc	Member	2008 - present
Latin American Association of Environmental and Re	Memeber and Regional representative	2007 - present
Association of Environmental and Resource Economis	Member	1999-2009

25. References

Referee One

Family name: BlackmanFirst: AllenInstitution: Resources for the FutureAddress: Washington DC
cityUnited States
countryEmail: blackman@rff.orgPhone: 2023285073

Fax: _____

Referee Two

Family name: PeiranoFirst: LuisaInstitution: Universidad de MontevideoAddress: Montevideo
cityUruguay
countryEmail: lpeirano@um.edu.uyPhone: 259827074461

Fax: _____

Referee Three

Family name: RucksFirst: JorgeInstitution: Dirección Nacional de Medio AmbienteAddress: Montevideo
cityUruguay
countryEmail: jotge.rucks@dinama.gub.uyPhone: 59829170710

Fax: _____

26. Self-assessment of English proficiency:

Reading: ExcellentWriting: ExcellentSpeaking: Excellent

27. Preferred host institution(s):

If you made arrangements for affiliation with a U.S. host institution, provide the following information and attach your letter of invitation. If you have not made arrangements for affiliation, identify three preferences. Be sure to give detailed reasons for each choice, and confirm that these universities offer programs in your field of interest.

(1) <u>Professor, Department, Telephone, Fax and E-mail</u>	<u>Institution and Institutional Address</u>
Professor: <u>John K. Stranlund</u>	Institution Name: <u>142103 : University of Massachusetts--Amherst</u>
Department: <u>Resource Economics</u>	Address: <u>80 Campus Center Way</u>
Phone: <u>4135456328</u>	<u>Amherst</u>
Fax: _____	<u>MASSACHUSETTS</u>
Email: <u>stranlund@resecon.umass.edu</u>	_____
Will you be attaching a letter of invitation in the document upload section? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
If you have not obtained a letter of invitation, please provide reasons for suggested affiliation:	
Initial contact made: <input type="checkbox"/> _____ date	Letter of invitation expected: <input type="checkbox"/> _____ by date
(2) <u>Professor, Department, Telephone, Fax and E-mail</u>	<u>Institution and Institutional Address</u>
Professor: _____	Institution Name: _____
Department: _____	Address: _____
Phone: _____	_____
Fax: _____	_____
Email: _____	_____
Will you be attaching a letter of invitation in the document upload section? Yes <input type="checkbox"/> No <input type="checkbox"/>	
If you have not obtained a letter of invitation, please provide reasons for suggested affiliation:	
Initial contact made: <input type="checkbox"/> _____ date	Letter of invitation expected: <input type="checkbox"/> _____ by date
(3) <u>Professor, Department, Telephone, Fax and E-mail</u>	<u>Institution and Institutional Address</u>
Professor: _____	Institution Name: _____
Department: _____	Address: _____
Phone: _____	_____
Fax: _____	_____
Email: _____	_____
Will you be attaching a letter of invitation in the document upload section? Yes <input type="checkbox"/> No <input type="checkbox"/>	
If you have not obtained a letter of invitation, please provide reasons for suggested affiliation:	
Initial contact made: <input type="checkbox"/> _____ date	Letter of invitation expected: <input type="checkbox"/> _____ by date

Caffera Marcelo, Federico
Name (Last First, Middle)

28. Home Mailing Address

Address: Diaz de Solis M297 S2 El Pinar
street city
Canelones M297 S2 15008
province/state country postal code
Email: marcaffera@um.edu.uy Phone: 59826987858 Fax: _____

29. Emergency Contact Information

Family name: Gonzalez First: Monica Middle: Noemi
Address: Juan Díaz de Solís - M297 S2 El Pinar
street city
Canelones Uruguay 15008
province/state country postal code
Email: monnoem@gmail.com Phone: 598095715522 Fax: _____

30. Marital Status: MARRIED

31. Names of dependents: (Not applicable for Iraq/MENA S&T applicants.)

Dependent One: Relationship to you _____ Length of stay in the US: _____
Family name: _____ First: _____ Middle: _____
Date of Birth: _____ 10. Place of birth: _____
city country
Country of Citizenship: _____ Country of Residence: _____

Dependent Two: Relationship to you _____ Length of stay in the US: _____
Family name: _____ First: _____ Middle: _____
Date of Birth: _____ 10. Place of birth: _____
city country
Country of Citizenship: _____ Country of Residence: _____

Dependent Three: Relationship to you _____ Length of stay in the US: _____
Family name: _____ First: _____ Middle: _____
Date of Birth: _____ 10. Place of birth: _____
city country
Country of Citizenship: _____ Country of Residence: _____

Dependent Four: Relationship to you _____ Length of stay in the US: _____
Family name: _____ First: _____ Middle: _____
Date of Birth: _____ 10. Place of birth: _____
city country
Country of Citizenship: _____ Country of Residence: _____

Dependent Five: Relationship to you _____ Length of stay in the US: _____
Family name: _____ First: _____ Middle: _____
Date of Birth: _____ 10. Place of birth: _____
city country
Country of Citizenship: _____ Country of Residence: _____

Dependent Six: Relationship to you _____ Length of stay in the US: _____
Family name: _____ First: _____ Middle: _____
Date of Birth: _____ 10. Place of birth: _____
city country
Country of Citizenship: _____ Country of Residence: _____

ONLINE

32. Do you expect to receive sabbatical pay, paid leave of absence or other sources of financial support during your Fulbright grant? Yes No

If you answered Yes, please specify source(s) and amount in U.S. dollars.
Please enter total amounts for the expected grant period, rather than monthly amounts.

Sources	Amount
Agencia Nacional de Investigación e Inno	1,000
Universidad de Montevideo	4,000

33. How did you learn about the Fulbright Visiting Scholar Program?

- Friend or Relative
- Fulbright Alumnus
- Poster/Flyer
- University (specify) _____
- Newspaper (specify) _____
- Other Publication (specify) _____
- Fulbright Web site (specify) _____
- Other Web site (specify) _____
- Other (describe) Fulbright Uruguay

34. How long did you consider applying for a Fulbright Visiting Scholar award before submitting this application? 0-1 year

35. Beyond the reputation of the Fulbright program itself, what were the major factors in helping you decide to apply for a Fulbright Visiting Scholar award?

- Publicity about the program Yes
- Advice of a colleague Yes
- Advice of a former Fulbrighter _____
- Time was right in my career Yes
- Other (please describe) _____

36. Physical impairment (please describe, if any):

By my signature below, I certify that to the best of my knowledge, the information provided in all parts of my application is accurate and complete. I understand that final approval of my application is dependent upon my eligibility for a J Visa in the United States. I agree to return to my home country upon the expiration of my authorized stay in the United States.

Signature: Marcelo Caffera

Date: November 29, 2010

Economic Experiments for the Analysis of the Compliance Behavior of Polluters with Environmental Regulation

Marcelo Caffera
Uruguay

1. What will we do¹

General Objective: To design and conduct laboratory experiments to test hypotheses about the compliance behavior of polluting firms facing different environmental regulations. Testing these hypotheses will allow us to produce policy recommendations on (i) the design of cost-effective enforcement strategies, and (ii) the cost-effective choice of policy instruments to cap emissions of a certain pollutant.

Specific Objectives: To test two groups of hypotheses. A first group consists of hypotheses regarding the behavior of firms under different structures of the penalties for non-complying (linear or quadratic in the level of violation), and under different policy instruments (a system of emissions standards and a competitive market for tradable pollution permits). Based on the observed behavior, a second group of hypotheses will be answered. These relate to the relative cost-effectiveness of tradable permits versus emission standards.

2. Methodology

As said, we will design and conduct economic experiments. These are a relatively new but consolidated tool used to test behaviors in economics and other social sciences. They simulate real situations in a controlled environment in which actual persons take economic decisions. In the case of our project, the experiments will be computer based simulations of different regulatory scenarios, arising from combinations of different enforcement strategies and policy instruments (emission standards and tradable pollution permits). The decisions that the persons participating in the experiments will have to take will be basically how much to pollute and how much to comply with the regulation, given that this is costly.

In order to assure that the persons take the decisions seriously, as an actual polluter would, the persons participating in the experiments earn actual money at the end of the experiment, depending on their level of profits in the simulated regulatory game. We have a two-year grant from the national agency for innovation and research of Uruguay (Agencia Nacional de Investigación e Innovación, ANII) to finance these experiments.

The core of the project aims to test the hypotheses with students in the city of Montevideo in a computer lab at the Universidad de Montevideo, my home institution. Nevertheless, we are also considering performing some rounds of these experiments in “the field”, with actual businessmen, recruited from the National Chamber of Commerce and the Uruguayan Industry Chamber.

¹ Although I am individually applying for this scholarship, this is a collaborative research project with my colleague Prof. Carlos Chávez, from the Universidad de Concepción, Chile.

3. Time frame

We will start the project in March 1st. We plan to work on the design of the experiments for six months, from March to August 2011. This will include the calibration of the parameters of the different regulatory games (such as the benefit functions, the penalty functions, etc.), but also determining the number treatments, the number of sessions, etc. This phase also consist of designing and writing the instructions for the participants, and a possible survey.

After this phase we plan to work on the design of the software for another two months, with the help of a programmer we are going to hire at this stage with funds from the ANII grant.

This phase is followed by another two month phase (November – December) in which we are going to run some pilot experiments to do the fine tuning of the design (testing the software, the instructions, etc.) and recruit the students for the actual experiments.

Finally, we are planning to train the students and run the experiments during January – March 2012.

4. Why the project needs to be done

Significance for my discipline: One of the most important aspects behind any policy is its economic cost. An emissions control policy is no exception. Environmental economists have been giving a clear recommendation on this regard for a long time: when possible, a regulator must cap aggregate emissions by creating a competitive market for pollution permits because this policy instrument minimizes the aggregate abatement costs of reaching any chosen cap with minimum information requirements for regulators.

This policy recommendation has had its impact. The European Union adopted an Emissions Trading Scheme as an important tool to limit emissions of greenhouse gases. Until the introduction of this scheme, the United States were home to the largest cap and trade scheme: the Federal Sulfur Dioxide (SO₂) Allowance Trading Program to control acid rain. The United States is also home of some well known regional markets, such as the NO_x and SO_x Regional Clean Air Incentives Market (RECLAIM) Program, of the South Coast Air Basin of California. Other regulatory programs based on transferable emission permits have been implemented in other countries too. A nearby example is the Emission Offset Program of Santiago de Chile, a market for Total Suspended Particles' emissions capacity.

Finally, both a “cap and trade” scheme and a tax on carbon emissions, remain at center stage among the possible policy instruments to control global emissions of greenhouse gases.

This impact of the policy recommendation in favor of tradable permits in particular and economic instruments in general can be seen as surprising because the costs of abatement are not the only social cost of reducing emissions. There are other relevant costs such as the costs of monitoring the regulated sources and sanctioning noncompliance. Nevertheless, until the work of Cafferata and Chavez (2010), the literature had not given an answer to the question of the relative cost - effectiveness of a system of tradable emission permits versus a system of emission standards when not only the abatement costs of the firms but also the enforcement costs of the regulator are included in the equation. Moreover, the theoretical results available in the literature have not been tested in the laboratory or the field. (See bibliography).

In this context, the project will make a contribution to the discipline and to policy design by providing experimental evidence on the effect that different designs of the enforcement strategy has on the behavior of the polluter firms, and therefore the possibility of designing cost-effective pollution control programs based on both emission standards and tradable permits. By doing this, the ultimate contribution of the project will be to provide experimental evidence on the relative costs of emission standards versus tradable permits when both instruments are optimally designed (as in Stranlund (2007) and Caffera and Chavez, 2010).

Significance for the country and the region:

One of the major impediments to the successful implementation of environmental policy in less developed countries is their lack of institutional capacity. The lack of skilled personnel at the environmental protection agencies is among these lacking capacities. This is particularly true in the case of the personnel trained in environmental economics. Most of the countries in the region lack these personnel in sufficient quantity and/or quality. As a result, it is more difficult to correctly design and support the implementation of pollution control programs based on economic instruments. Consequently, the region may be missing the opportunity of protecting the environment at lower social cost. Our project will contribute to start building the lacking capacity by disseminating the results of the research and the policy recommendations (on the design of cost-effective enforcement strategies and policy instruments for pollution control), among the regulatory community at the national and municipal levels.

Other Expected Results: We plan to hire two graduate students from the pool of students of the Master in Economics Program at the University of Montevideo. These students will be able to produce their thesis based on this project.

5. How my results will be disseminated

The results of the project will be disseminated in seminars in Montevideo, Maldonado and other possible cities in the country, yet to be determined. These activities will be complemented by previous presentations on the economic theory of environmental policy and its applications. I have also made preliminary contacts to replicate these activities among interested legislators.

Finally, I am also exploring collaborative activities with the national “environmental protection agency” (Dirección Nacional de Medio Ambiente, DINAMA). I had an interview with the Director of DINAMA, Jorge Rucks, who has expressed its interest in several possible collaborations including specifically the help in the design of new economic instruments for environmental protection that the agency is planning under a new institutional reform and new challenges, such as those arising from climate change. (See attached letter of reference by Jorge Rucks).

6. The nature of the proposed project in terms of the NEXUS program themes and the relevance of the project to the overall objectives of the program

As said, with these activities the project aims to start filling the environmental economics capacity gap of the country. This is important in terms of the NEXUS program objectives. Why? To put the global economy in a sustainable path we need to foster energy innovation. In other words, we need investment in research and development of new technologies that can exploit new sources of energy that are free of carbon emissions. A fundamental incentive to induce this kind of investment is to

increase the relative cost of the technologies that burn fossil fuels, particularly those that do it inefficiently. This is what economic instruments do, in a cost-effective manner, by correctly pricing the emissions of greenhouse gases. In this way, economic instruments are a fundamental tool in the transition to a low carbon economy in a timely fashion. In the absence these instruments the incentives to invest in alternative energy technologies will be lower. But in order to implement economic instruments regulators and legislators need to at least understand how they work and what they can accomplish. The project will help to start building this understanding.

7. What research facilities and resources are found in the Department of Resource Economics at UMass

John Stranlund, a Professor at the Resource Economics Department at UMass, is one of the leading scholars in the field of the economic theory of enforcing environmental policy. He is the author of several seminal articles in this field, including one directly related to this project (Stranlund, 2007). Prof. Stranlund, together with Prof. James Murphy, previously at the University of Massachusetts – Amherst, now at the University of Alaska – Anchorage, is also the author of one the articles in experimental economics that are closely related to the objectives of this research (Stranlund and Murphy, 2007). In fact, pursuing comparability, we are considering to base the design of our experiments on the design of the experiments ran by Prof. Stranlund and Prof. Murphy.

The Department of Resource Economics at the University of Massachusetts homes the Experimental Economics Program. Apart from Prof. Stranlund, the Department has four more members of the Faculty working on experimental economics, and another faculty member, IT and computer programming expert, who has designed software very similar to the software we are planning to use in our experiments

The Department is also home of the Cleve E. Willis Experimental Economics Laboratory, a state of the art facility to conduct economic experiments.

For all these reasons, the Department of Resource Economics at the University of Massachusetts – Amherst provides the ideal environment to work on the design of our experiments.

Marcelo Caffera
CURRICULUM VITAE

EDUCATION

Ph.D. Resource Economics, University of Massachusetts – Amherst, 2004.

M.Sc. Resource Economics, University of Massachusetts – Amherst, 2000.

B.A. Economics, Universidad de la República, Uruguay, 1997.

ACTUAL POSITION

Professor, Department of Economics, Universidad de Montevideo. Since 2003.

Graduate Program Director, Department of Economics, Universidad de Montevideo. Since 2004.

Research Director, School of Economics and Business, University of Montevideo. Since March 2008.-

TEACHING

Current Courses

Graduate: Microeconomics I, Environmental Economics.

Undergraduate: Microeconomics I, Microeconomics II.

Other Positions / Courses:

- Professor of Environmental Economics, Ph.D. Program in Economics, *Catholic University of Argentina*. (2009).
- Professor of Environmental Economics, Master in Rural Sustainable Development, *School of Agriculture, University of the Republic*. 2007 and 2005.
- Institutional Economics, *Communication Services Regulatory Unit, Uruguayan Government*, October 2007.
- The Economics of Environmental Enforcement, Departamento de Análisis Económico Aplicado, *University of Las Palmas de Gran Canaria*, Spain, May 2007. (With Carlos Chavez, Universidad de Concepción, Chile).
- Environmental Economics, Master Program in Environmental Engineering, *School of Engineering, University of the Republic*. 2001.

Teaching assistantship:

- Natural Resource Economics and Environmental Policy, *Prof. Barry Field, University of Massachusetts – Amherst*, Fall 2002.
- Cost - Benefit Analysis, *University of the Republic*, 2001 – 2003.
- Environmental Economics, *Prof. John Stranlund, University of Massachusetts – Amherst*, Fall 1999.
- Introduction to the Statistics of the Social Sciences, *University of Massachusetts – Amherst*, Spring 1999.

RESEARCH

Publications

In peer-reviewed journals:

- Caffera, M. (2010). "The use of economic instruments for pollution control in Latin America: lessons for future policy design", *Environment and Development Economics*, doi: 10.1017/S1355770X10000434, Published online by Cambridge University Press on 2 December 2010.

In not peer-reviewed journals:

- Caffera, M. (2007). "Estimación de los beneficios de la disminución en el nivel de riesgo por exposición a plaguicidas en Uruguay", *Revista de Ciencias Empresariales y Economía* de la FCEE, Universidad de Montevideo. Año 6, 83 – 97.
- Caffera, M. (2006). "Legislación Simbólica", *Revista de Ciencias Empresariales y Economía* de la FCEE, Universidad de Montevideo. Año 5, 153 – 159.
- Amarante, V. y M. Caffera. (2003). "Determinantes Económicos de la Formación de Asentamientos Irregulares", *Revista de Ciencias Empresariales y Economía* de la FCEE, Universidad de Montevideo. 2, 61 – 95.

Book Chapters:

- Caffera, M. (2010), "Estrategias para reducir o eliminar las barreras económicas asociadas al uso sostenible de servicios ecosistémicos", en Manfred Steffen & Hugo Inda (editores), *Bases Técnicas para el Manejo Integrado de la Laguna del Sauce y cuenca asociada*, forthcoming.
- "Conclusiones, recomendaciones e instrumentos económicos", in GEO Uruguay. Informe del estado del Ambiente. Programa de las Naciones Unidas para el Medio Ambiente. 2008. Co-autor.

Articles in other periodicals:

- Columna en Suplemento Ecología de La Diaria, 5 de Junio de 2010 (En página 4 y 5).
- [“Hablemos de Cambio Climático”](#), Suplemento Economía y Mercado de El País, Montevideo, Uruguay. 27/04/2009.
- [“Sobre el Nobel a Elinor Ostrom”](#), Suplemento Economía y Mercado de El País, Montevideo, Uruguay. 26/10/2009.
- Caffera, M. (2002). “Estados, Mercados, y Comunidades en la explotación de Recursos Naturales, *Ambios Cultura Ambiental*, Marzo.

Submitted work:

- “The Cost-Effective Choice of Policy Instruments to Cap Aggregate Emissions with Costly Enforcement” (2010). With Carlos Chávez. Submitted to *Environmental and Resource Economics*. RR.

Unpublished working papers:

- “¿Estudiar Economía te hace más egoísta?”, con Leandro Zipitría (2008)
- “Getting Polluters to Tell the Truth”, with Juan Dubra, 2007.
- “Effectiveness of the Enforcement of Industrial Emission Standards in Montevideo, Uruguay”, 2007.
- “Achieving an Environmental Target with an Emissions Tax under Incomplete Enforcement”, with Carlos Chávez, Universidad de Concepción – Chile (2007).
- “Imperfectly Enforceable Pollution Tax with Asymmetric Information”, with John Stranlund, University of Massachusetts, - Amherst, 2007.
- “The Implementation and Enforcement of Environmental Regulations in a Less Developed Market Economy: evidence from Uruguay”, Ph.D. Dissertation. Department of Resource Economics. University of Massachusetts – Amherst. 2004.
- “Economic Analysis of the Industrial Water Pollution Control Policy in Montevideo”, Comisión Sectorial de Investigación Científica (CSIC), University of the Republic, June 2002.

Ongoing work:

- “Selfishness and Economics: self selection or indoctrination?” with Leandro Zipitría y Lucila Arboleya.
- “Trust or Risk Aversion? Evidence from eight Latin American cities”, with Nestor Gandelman, ORT University, Uruguay.

OTHER ACADEMIC ACTIVITIES

- I collaborated together with a group of scholars in the translation to Spanish of the book “Microeconomics. Behavior, Institutions and Evolution”, Samuel Bowles. (Princeton University Press, 2004).
- Coordinator of the Project “Transfer of Knowledge Applied to the Environmental Sustainability”, between the University of Montevideo and the University of Las Palmas de Gran Canaria, Spain, financed by the Agencia Española de Cooperación Internacional. Proyecto B/6959/06. Año 2007.

PROFESSIONAL

Service

- Founding member of the Uruguayan Society of Ecological Economics. 2010 – present.
- Regional Representative (Elected), *Latin American and Caribbean Association of Environmental and Natural Resource Economists (ALEAR)*. 2007.
- Delegate of the National Chamber of Commerce to the Environmental Advisory Board, Ministry of the Environment, and the Montevideo Environmental Group of the Municipal Government of Montevideo, 2000 – 2002.

Experience

- Member of CPA Ferrere Technical Team, Technical Report – Aratiri Project Impact in Uruguay, May – June 2010.
- Consultant, “*National System of Protected Areas*” Project, National Environmental Authority, Uruguay. (2009)
- Consultant, *Environmental Impact Assessment 2007*, Compañía Forestal Oriental, S.A., Paysandú, Uruguay. (2007).

- Consultant, “*Elaboration of the Environmental Quality Norms for Natural Waters*”, Panama Government, Loan Contract 1222-OC-PN BID, N° CONS57-L
- Consultant, “*Support for the Development of the National Implementation Plan for Persistent Organic Pollutants in Uruguay*” Project, URU/02/012. 08/2005 – 04/2006.
- Consultant, Environmental Protection of the Río de la Plata and its Maritime Front: Pollution Prevention and Control and Habitat Restoration (RLA/99/G31), 2004.
- Assistant consultant in private projects evaluations (2001)
- Assistant Economic Advisor, Department of Economic Studies, National Chamber of Commerce, April 20th 1994 – August 20th 1998.

GRANTS

- Research Project: “Laboratory Experiments for the Analysis of the Compliance Behavior of Firms under Environmental Regulation”. Financing Institution: National Agency of Research and Innovation - Fund “Prof. Clemente Estable” 2009. Co-researcher: Carlos Chavez, University of Concepción, Chile.
- Research Project: “The Selection of Environmental Policy Instruments with Incomplete Compliance”. Financing Institution: National Agency of Research and Innovation - Fund “Prof. Clemente Estable” 2007. Co-researcher: Carlos Chavez, University of Concepción, Chile.
- National Fund “Prof. Clemente Estable” 2007, National Agency of Research and Innovation. Research Project: “The Selection of Environmental Policy Instruments with Incomplete Compliance”, with Carlos Chavez, University of Concepción, Chile.
- “Transfer of Knowledge Applied to Environmental Sustainability”, Universidad de Montevideo – Universidad de Las Palmas de Gran Canaria. Project financed by: Agencia Española de Cooperación Internacional. Proyecto B/6959/06. Year 2007.
- Selected for the National Researchers Fund 2005. National Office of Science and Technology.
- National Fund “Prof. Clemente Estable” 2005, National Office of Science and Technology. Research Project: “The implementation of an emissions tax with asymmetric information and imperfect enforcement”, with John Stranlund.
- Research Initiation Support Program, Comisión Sectorial de Investigación Científica (CSIC), University of the Republic, 2001.

REFEREEING

- *Environment and Development Economic, Fondo María Viñas, Agencia Nacional de Investigación e Innovación de Uruguay, Journal of Applied Economic, Latin American and Caribbean Environmental Economics Program, Latin American and Caribbean Economic Association*

HONORS AND AWARDS

- Member of the National System of Researchers, National Agency for Research and Innovation. Since 2008.
- Award for the presentation “The Determinant of Irregular Settlements” (with Verónica Amarante) in the international Seminar on Land Economics “Prof. Dr. Patricio Rodé”. Competition organized by the Municipal Government of Montevideo and the Ministry of the Environment. Montevideo, October 2006.
- Second prize, for “Effectiveness of the Enforcement of Industrial Emission Standards in Montevideo, Uruguay”, second edition of the National Award in Economics "Prof. Raúl Trajtenberg", November de 2004
- *Carolyn Harper Fellow 1999, University of Massachusetts – Amherst.*
- *Fulbright Scholar 1998 – 2000.*

SEMINAR PRESENTATIONS

- World Congress of Environmental and Resource Economists, Montreal, Canada, 2010.
- Annual Seminar of Economics, Central Bank of Uruguay, Montevideo, 2010, 2009, 2008.
- IAE Business School, Universidad Austral, Buenos Aires, Argentina, December 2008.
- 16th Annual Conference, European Association of Environmental and Resource Economists, Gothenburg, Sweden, June 2008.
- I, II and III Congress of the Latin American and Caribbean Association of Environmental and Natural Resource Economists, 2003, 2005 and 2007.
- Universidad de Concepción, Chile, June 2006
- Universidad Torcuato di Tella, Buenos Aires, Junio 2005.



UNIVERSITY OF MASSACHUSETTS

AMHERST

Stockbridge Hall
80 Campus Center Way
Amherst, MA 01003-9246

Department of Resource Economics

<http://www.umass.edu/resec>

December 14, 2010

Marcelo Caffera
Facultad de Ciencias Empresariales y Economía
Universidad de Montevideo
Prudencio de Pena 2440
CP 11600 – Montevideo
Uruguay

Dear Professor Caffera,

I am pleased to extend an invitation to you to visit the Department of Resource Economics at the University of Massachusetts-Amherst for the period July 1, 2011 to August 31, 2011. My colleagues and I are very interested in your proposal to design economic experiments to examine issues of enforcement in environmental policy. As you know, we too have an active research program in this area so we anticipate a mutually beneficial exchange of ideas. We will make the following available to you during your visit: office space, a computer with internet connection, and library privileges.

My colleagues and I look forward to your visit.

Sincerely,

John K. Stranlund, Professor
Department of Resource Economics
214 Stockbridge Hall
University of Massachusetts
80 Campus Center Way
Amherst MA 01003-9246
TEL: 413-545-6324
FAX: 413-545-5853
EMAIL: stranlund@resecon.umass.edu

United States Information Agency EXCHANGE VISITOR PROGRAM SERVICES, GC/V CERTIFICATE OF ELIGIBILITY FOR EXCHANGE VISITOR (J-1) STATUS

F521747

1. CAFFERA (FAMILY NAME OF EXCHANGE VISITOR) MARCELO (FIRST NAME) FEDERICO (MIDDLE NAME) (X) Male () Female born 09/07/1972 in MONTEVIDEO URUGUAY a citizen of URUGUAY a legal permanent resident of URUGUAY OTHER-PRIVATE BUSINESS 319 (Pos. Code) U.S. address Dept. of Resource Economics 214 Draper Hall University of Massachusetts Amherst MA 01003

THE PURPOSE OF THIS FORM IS TO: 1 () Begin a new program () Accompanied by immediate family members. 2 (X) Extend an on-going program. 3 () Transfer to a different program. 4 () Replace a lost IAP-66 form; amend a previous IAP-66 form. 5 () Permit visitor's immediate family (members) to enter U.S. separately. 6 () Reinstatement request to USIA.

2. will be sponsored by to participate in Exchange Visitor Program No. which is still valid and is officially described as follows:

A program of the United States Information Agency, to promote mutual understanding and cooperation by awarding and administering (either directly or through designated organizations), grants to qualified foreign nationals to study and/or pursue professional development at accredited post-secondary colleges, universities, or other selected institutions or organizations in the United States.

3. This form covers the period from 09/30/99 to 08/29/00 Exchange Visitors are permitted to travel abroad & maintain status (e.g. obtain a new visa) under duration of the program as indicated by the dates on this form.

4. The category of this visitor is 1 (X) Student, 2 () Trainee, 3 () Teacher, 4 () Professor, 5 () International Visitor, 6 () Alien Physician, 7 () Government Visitor, 8 () Research Scholar, 9 () Short-Term Scholar, 10 () Specialist, 11 () Camp Counselor. The specific field of study, research, training or professional activity is 1590 verbally described as: Ph.D. ECONOMICS MISCELLANEOUS U. MA Amherst AMHERST MA 01002-3291 12 () Summer Travel/Work

5. During the period covered by this form, the total estimated financial support (in U.S. \$) is to be provided to the exchange visitor by: a. (X) The Program Sponsor in item 2 above \$ 11,000.00 Fulbright grant associated costs: This Program Sponsor has (X) has not () (check one) received funding for international exchange from one or more U.S. Government Agency(ies) to support this exchange visitor. Financial support from organizations other than the sponsor will be provided by one or more of the following: b1. () U.S. Government Agency(ies); b2. () International Organization(s); d. () The Exchange Visitor's Government; e. () The binational Commission of the visitor's Country; f. (X) All other organizations providing support \$ 17,518.00 U. MA, Amherst; g. () Personal funds \$

6. USIA/INS USE OR CERTIFICATION BY RESPONSIBLE OFFICER THAT A NOTIFICATION COPY OF THIS FORM HAS BEEN PROVIDED TO USIA (INCLUDE DATE). TO USIA 8/13/99

7. LISA KNEPSHIELD Assistant Manager (Name of Official Preparing Form) (Title) The Institute of International Educ 809 United Nations Plaza New York, NY 10017-3580 (Address of Responsible Officer or Alternate R.O.) (Telephone No.) July 27, 1999 (Date) (Signature of Responsible Officer or Alternate R.O.)

PRELIMINARY ENDORSEMENT OF CONSULAR OR IMMIGRATION OFFICER REGARDING SECTION 212 (a) OF THE IMMIGRATION AND NATIONALITY ACT PL 94-484 AS AMENDED (SEE REVERSE SIDE ITEM 1(a)). (Name) (Title) has determined that this alien in the above program: 1. () is not subject to the two year residence requirement. 2. () is subject based on: A. () government financing and/or B. () the Exchange visitor skills list and/or C. () PL 94 484 as amended. (Signature of Officer) (Date)

8. STATEMENT OF RESPONSIBLE OFFICER FOR RELEASING SPONSOR (FOR TRANSFER OF PROGRAM) Date Transfer of this exchange visitor from program No. sponsored by to the program specified in item (2) is necessary or highly desirable and is in conformity with the objectives of the Mutual Educational and Cultural Exchange Act of 1961. (Signature of Responsible Officer or Alternate R.O.) (Date)

INSTRUCTIONS FOR AND CERTIFICATION BY THE ALIEN BENEFICIARY NAMED ON PAGE 1 OF THIS FORM:

Read and complete this page prior to presentation to a United States Consular or Immigration Official.

1. I understand that the following conditions are applicable to exchange visitors:

- (a) **TWO-YEAR HOME-COUNTRY PHYSICAL PRESENCE REQUIREMENT (SECTION 212(E) OF THE IMMIGRATION AND NATIONALITY ACT AND PL 94-484, AS AMENDED):** Exchange visitors and their dependents may be subject to the two-year home-country physical presence requirement. **RULE:** Exchange visitors whose programs are financed in whole or in part, directly or indirectly by either their government or by the U.S. Government, are required to reside in their home-country for two years following completion of their program before they are eligible for immigrant status, temporary worker (H) status, or intracompany transferee (L) status. Likewise, if exchange visitors are acquiring a skill which is in short supply in their home country (these skills appear on the "Exchange Visitor Skills List") they will be subject to the same two-year home-country residence requirement. The requirement also is applicable to alien physicians entering the U.S. to receive graduate medical education or training. The United States Information Agency (USIA) reserves the right to make the final determination. **NOTE: MARRIAGE TO A U.S. CITIZEN OR LEGAL PERMANENT RESIDENT, OR BIRTH OF A CHILD IN THE U.S., DOES NOT REMOVE THIS REQUIREMENT.**
- (b) **Extension of Stay/Program Transfers:** A completed Form IAP-66 is required in order to apply for a program extension or program transfer, and must be obtained from or with the assistance of the sponsor.
- (c) **Limitation of Stay: STUDENTS** - as long as they pursue a full course of study towards a degree, or if engaged full-time in a non-degree program, up to 24 months. Students for whom the sponsor recommends academic training may be permitted to remain for an additional period of up to 18 months after receiving their degree or certificate; post-doctoral academic training may be approved by the sponsor for a period not to exceed 36 months; secondary students up to 1 academic year; **TRAINEES** - 18 months; **FLIGHT TRAINEES** - 24 months; **TEACHERS, PROFESSORS, and RESEARCH SCHOLARS** - 3 years; **SHORT-TERM SCHOLARS** - 6 months; **SPECIALISTS** - 1 year; **INTERNATIONAL VISITORS** - 1 year; **ALIEN PHYSICIANS** - the time typically required to complete the medical specialty involved but limited to 7 years with the possibility of extension if approved by the Director of the U.S. Information Agency; **GOVERNMENT VISITOR** - up to 18 months; **CAMP COUNSELOR** - up to 4 months; **SUMMER TRAVEL/WORK** - up to 4 months.
- (d) **Documentation Required for Admission/Readmission as an Exchange Visitor.** To be eligible for admission/readmission to the U.S., an exchange visitor must present the following at the port of entry: (1) a valid nonimmigrant visa, unless exempt from nonimmigrant visa requirements; (2) a passport valid for 6 months beyond the anticipated period of admission, unless exempt from passport requirements; (3) a properly executed Form IAP-66. Copies 1 and 2 of Form IAP-66 must be surrendered to a U.S. Immigration Officer upon arrival in the U.S. Copy 3 must be retained by the exchange visitor for re-entries within the period of previously authorized stay.
- (e) **Change of Status:** Exchange visitors are expected to leave the U.S. upon completing their program objective. Exchange visitors who are subject to the two-year home-country physical presence requirement are not eligible to change their status while in the U.S. to any other nonimmigrant category except, if applicable, that of official or employee of a foreign government (A) or an international organization (G) or member of the family or attendant of either of these types of officials or employees.
- (f) **Insurance:** Exchange visitors are required to have medical insurance in effect for themselves and any accompanying spouse and dependents on J visas during the duration of their exchange program. At a minimum, insurance coverage shall include: (1) medical benefits of at least U.S. \$50,000 per person per accident or illness; (2) repatriation of remains in the amount of U.S. \$7,500; and (3) expenses associated with medical evacuation in the amount of U.S. \$10,000. A policy secured to fulfill the insurance requirements shall not have a deductible that exceeds U.S. \$500 per accident or illness, and must meet other standards specified in the Exchange Visitor Program regulations, 22 CFR Part 514.14. For details, consult your program's Responsible Officer (see item 7 on the front side of this form).

2. EXCHANGE VISITOR CERTIFICATION: I have read and understand the foregoing, including the Two-Year Home-Country Physical Presence Requirement, and agree to comply with the Exchange Visitor Program regulations, as amended (22 CFR Part 514). I certify that all the information on the Form IAP-66 is true and correct to the best of my knowledge. I agree that I will maintain compliance with the insurance regulations as specified in 22 CFR 514.14, including maintaining health insurance coverage for myself and my J-2 dependents throughout my J-1 program. I understand that it is my responsibility to maintain my exchange visitor status. For the purposes of 20 U.S.C. 1232g and 22 CFR 514, I authorize the USIA-designated sponsor and any educational institution named on the Form IAP-66 to release information to USIA relating to compliance with Exchange Visitor Program regulations.

M. Lambert
(Signature of Applicant)

AMHERST - MASSACHUSETTS
(Place)

08/18/99
(Date)

VALIDATION BY RESPONSIBLE OFFICER

(Maximum validation period is one year*)

*EXCEPT: Maximum validation period is up to six months for Short-term Scholars and four months for Camp Counselors and Summer Travel/Work.

NOTICE TO ALL EXCHANGE VISITORS

To facilitate your readmission to the United States after a visit in another country other than a contiguous territory or adjacent islands, you should have the Responsible Officer of your sponsoring organization indicate on this copy of the Form IAP-66 that you continue to be in good standing.

The signature of the Responsible Officer or the Alternate Responsible Officer on this copy is valid for up to one year or until the end date in item 3 on the front side of this Form, or to the validation date authorized by the Responsible Officer, whichever occurs sooner.

(1) Exchange Visitor is in good standing to 8/29/2000
Pamela J. [Signature] 12/2/99
Signature of Responsible Officer Date

(2) Exchange Visitor is in good standing to _____

Signature of Responsible Officer Date

(3) Exchange Visitor is in good standing to _____

Signature of Responsible Officer Date

United States Information Agency EXCHANGE VISITOR PROGRAM SERVICES, GC/V CERTIFICATE OF ELIGIBILITY FOR EXCHANGE VISITOR (J-1) STATUS

E 818916

1. Caffera, Marcelo Federico (Male) born 03/07/72 in Montevideo, Uruguay a citizen of Uruguay a legal permanent resident of Uruguay. U.S. address: University of Massachusetts, Amherst Graduate School, Amherst, MA 01002-3291

- THE PURPOSE OF THIS FORM IS TO: 1 (X) Begin a new program () Accompanied by immediate family members 2 () Extend an on-going program 3 () Transfer to a different program 4 () Replace a lost form; correct a previous form. 5 () Permit visitor's immediate family () members to enter U.S. separately.

2. will be sponsored by Fulbright Commission to participate in Exchange Visitor Program No. G-112,0001, which is still valid and is officially described as follows:

A program of the USIA to promote mutual understanding and cooperation by awarding and administering either directly or through designated organizations, grants to qualified foreign nationals to study and/or pursue professional development at accredited post-secondary colleges, universities, or other selected institutions or organizations in the United States.

3. This form covers the period from 08/30/98 to 08/29/99. Students are permitted to travel abroad & maintain status (e.g. obtain a new visa) under duration of the program as indicated by the dates on this form.

4. The category of this visitor is 1 (X) Student, 2 () Trainee, 3 () Teacher, 4 () Professor, 5 () International Visitor, 6 () Alien Physician, 7 () Government Visitor, 8 () Research Scholar, 9 () Short-Term Scholar, 10 () Specialist, 11 () Camp Counselor. The specific field of study, research, training or professional activity is 1590 - Economics, Misc

5. During the period covered by this form, the total estimated financial support (in U.S. \$) is to be provided to the exchange visitor by: a. (X) The Program Sponsor in item 2 above \$ 11,000.00 This Program Sponsor has () has not () received funding for international exchange from one or more U.S. Government Agency(ies) to support this exchange visitor. Financial support from organizations other than the sponsor will be provided by one or more of the following: b1. () U.S. Government Agency(ies): (Agency Code), \$ b2. () (Agency Code), \$ c1. () International Organization(s): (Int. Org. Code), \$ c2. () (Int. Org. Code), \$ d. () The Exchange Visitor's Government \$ e. () The binational Commission of the visitor's Country \$ f. (X) All other organizations providing support \$ 9,018.00 g. (X) Personal funds \$ 7,214.00

6. I.N.S. OR U.S.I.A. USE AUG 21 1998

7. Eric Carlson Acting Public Affairs Officer (Name of Official Preparing Form) American Embassy, Montevideo (Address) E. Carlson (Signature of Responsible Officer or Alternate R.O.) 07/21/98 (Date)

PRELIMINARY ENDORSEMENT OF CONSULAR OR IMMIGRATION OFFICER REGARDING SECTION 212 (a) OF THE I.N.S. I. (Name) (Title) I have determined that this alien in the above program 1. () is not subject to the two year residence requirement. 2. () is subject based on: - A. () government financing and/or B. () the Exchange visitor's skills list and/or C. () PL 94 484 as amended The United States Information Agency reserves the right to make the final determination. (Signature of Officer) (Date)

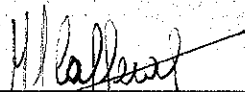
8. STATEMENT OF RESPONSIBLE OFFICER FOR RELEASING SPONSOR (FOR TRANSFER OF PROGRAM) Date, Transfer of this exchange visitor from program No. sponsored by to the program specified in item (2) is necessary or highly desirable and is in conformity with the objectives of the Mutual Educational and Cultural Exchange Act of 1961. (Signature of Officer) (Date)

INSTRUCTIONS FOR AND CERTIFICATION BY the ALIEN BENEFICIARY named on page 1 of this Form:

Read and complete this page prior to presentation to a United States Consular or Immigration Official.

I understand that the following conditions are applicable to exchange visitors:

- (a) **Extension of Stay/Program Transfers:** A completed Form IAP-66 is required in order to apply for an extension or transfer and must be obtained from, or with the assistance of, the sponsor. It must be submitted to the U.S. Information Agency within forty-five days before the expiration of the authorized period of stay.
- (b) **Limitation of Stay:** **STUDENTS** - as long as they pursue a full course of study towards a degree, or if engaged full-time in a non-degree program, up to 24 months. If the sponsor recommends academic training they may be permitted to remain for an additional period of up to 18 months after receiving their degree or certificate; secondary students up to 1 academic year; **TRAINEES** - 18 months; **FLIGHT TRAINEES** - 24 months; **TEACHERS, PROFESSORS, AND RESEARCH SCHOLARS** - 3 years; **SHORT-TERM SCHOLARS** - 4 months; **SPECIALISTS** - 1 year; **INTERNATIONAL VISITORS** - 1 year; **ALIEN PHYSICIANS** - the time typically required to complete the medical specialty involved but limited to 7 years with the possibility of extension if approved by the Director of the U.S. Information Agency; **GOVERNMENT VISITOR** - up to 18 months; **CAMP COUNSELOR** - up to 4 months.
- (c) **Documentation Required for Admission/Readmission as an Exchange Visitor:** To be eligible for admission/readmission to the U.S., an exchange visitor must present the following at the port of entry: (1) A valid nonimmigrant visa, unless exempt from nonimmigrant visa requirements; (2) A passport valid for 6 months beyond the anticipated period of admission, unless exempt from passport requirements; (3) a properly executed Form IAP-66. Copies 1 and 2 of Form IAP-66 must be surrendered to a U.S. Immigration Officer upon arrival in the U.S. Copy 3 must be retained for re-entries within a period of previously authorized stay.
- (d) **Change of Status:** Exchange visitors are expected to leave the U.S. upon completing their program objective. Exchange visitors who are subject to the two-year home country physical presence requirement are not eligible to change their status while in the U.S. to any other nonimmigrant category except, if applicable, that of official or employee of a foreign government (A) or an international organization (G) or member of the family or attendant of either of these types of officials or employees.
- (e) **Two-Year Home Country Physical Presence Requirement:** Exchange visitors whose programs are financed in whole or in part, directly or indirectly by either their government or by the U.S. Government, are required to reside in their own country for 2 years following completion of their program before they are eligible for immigrant status; temporary worker (H); or an intracompany transferee (L). Likewise, if exchange visitors are acquiring a skill which is in short supply in their home country (these skills appear on the "Exchange Visitor Skills List") they will be subject to the same two-year home country residence requirement. The requirement also is applicable to alien physicians entering the U.S. to receive graduate medical education or training (Section 212(e) of the Immigration and Nationality Act and PL 94-484, as amended).



(Signature of Applicant)

MONTENIDEO - URUGUAY

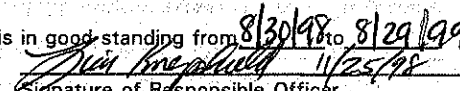
(Place)

07/27/98

(Date)

IAP-66 (9-93)

VALIDATION BY RESPONSIBLE OFFICER

(1) Exchange Visitor is in good standing from 8/30/98 to 8/29/99


Signature of Responsible Officer

NOTICE TO ALL EXCHANGE VISITORS

To facilitate your readmission to the United States after a visit in another country other than a contiguous territory or adjacent islands, you should have the Responsible Officer of your sponsoring organization indicate that you continue to be in good standing on this copy of the Form IAP-66.

(2) Exchange Visitor is in good standing from _____ to _____

Signature of Responsible Officer

(3) Exchange Visitor is in good standing from _____ to _____

Signature of Responsible Officer

(4) Exchange visitor is in good standing from _____ to _____

Signature of Responsible Officer



Director
Nacional

FIRMA AUTORIZADA / ASSINATURA DA ENTIDADE EMISSORA / AUTHORITY SIGNATURE
Insp. Mayor (P. T.) Dr. Ruben Amato Luseraían

PROFESION / PROFISSÃO / OCCUPATION

ECONOMISTA

ESTADO CIVIL / ESTADO CIVIL / MARITAL STATUS

CASADO/A

**JUAN DIAZ DE SOLIS MANZANA 297 SOLAR 2
EL PINAR CANELONES URUGUAY**

PULGAR DERECHO
POLEGAR DIREITO
RIGHT THUMB

DIRECCIÓN DEL TITULAR
DOMÍLIO DO TITULAR
BEARER'S ADDRESS

FIRMA DEL TITULAR
ASSINATURA DO TITULAR
SIGNATURE OF BEARER



REPUBLICA ORIENTAL DEL URUGUAY

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APELLIDOS / SURNAMES

CAFFERA COLLAZO

NOMBRES / GIVEN NAMES

MARCELO FEDERICO

NACIONALIDAD / NATIONALITY

URUGUAYA

FECHA DE NACIMIENTO / DATE OF BIRTH

07 Mar 1972

PASAPORTE Y C.I. Nº / PASSPORT
AND ID. CARD Nbr.

01.992.403-5

SEXO / SEX

M

LUGAR DE NACIMIENTO / PLACE OF BIRTH

MONTEVIDEO / URY

FECHA DE EXPEDICIÓN / DATE OF ISSUE

13 May 2010

AUTORIDAD / AUTHORITY

DNIC-MONTEVIDEO

FECHA DE VENCIMIENTO / DATE OF EXPIRY

13 May 2015

P<URYCAFFERA<COLLAZO<<MARCELO<FEDERICO<<<<<<<

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Bibliography - Current state of knowledge

Theory

Until Caffera and Chavez (2010), the literature had not given an answer to the question of the relative cost - effectiveness of a system of tradable emission permits versus a system of emission standards when not only the abatement costs of the firms but also the enforcement costs of the regulator are included in the equation. These authors extend the literature in several ways. First, they extend the work of Arguedas (2008) to derive the condition under which a regulator can reduce the social costs of an emissions control program based on emission standards by inducing perfect compliance. This condition is conceptually identical to that derived by Stranlund (2007) for the case of tradable permits. This allows to conclude that whether it is cost-effective or not to induce perfect compliance in an emissions control program does not depend on the regulatory instrument used (emission standards or transferable permits), but on the relative marginal costs of monitoring emissions vs. punishing non-compliance.

Second, Caffera and Chavez (2010) derived the conditions characterizing how the regulator has to set the monitoring probability and the emission standard for every firm when it is not cost effective to induce perfect compliance and it wants to cap the aggregate emissions of a pollutant to a certain level minimizing the social costs of the program. The latter include: (a) the firms' costs of reducing emissions, (b) the regulator's costs of monitoring the firms' emissions, and (c) the costs incurred by the regulator when sanctioning those who do not comply, after being discovered.

Third, Caffera and Chavez (2010) compared the social costs of such a program to the social costs of a program that is also based on emission standards that induces the same level of aggregate emissions but it is perfectly enforced (characterized by Malik 1992). The result is that the latter is always cheaper than the former.

Fourth, Caffera and Chavez (2010) compare the total social cost of an optimally designed program based on emission standards (a program that induces perfect compliance) with the costs of an optimally designed program based on tradable permits. The characterization of the latter is in Stranlund (2007) and involves fully enforcing the program (issuing a number of permits equal to the cap and making every firm to emit a level of emissions equal to the number of permits holding). The result of the comparison is that an emissions control program based on emission standards is always cheaper in social terms to a program based on tradable permits, except when the costs of inspection do not vary between firms and when the fine for non compliance is linear (a fixed amount per ton in excess of those permitted).

Finally, Caffera and Chavez (2010) also compare the total social costs of a program optimally designed based on the emission standards with that of an optimally designed program based on tradable permits, when it is optimal to induce violations. The comparison shows that the conditions under which tradable permits are equally costly in expected terms to a program based on emission standards are even more special in this case.

These results seem to contradict the classic recommendation by environmental economists, which states that tradable permits are cost-effective instruments for pollution control. Nevertheless, this recommendation is based only on abatement costs, which tradable permits certainly minimize. What the results above show is that when the enforcement costs are brought into the picture, tradable permits can minimize the total costs of an emission control program only if the costs of monitoring emissions do not differ between polluters or when the penalty for not complying is linear. Moreover,

the superiority of emission standards that seems to come out from the above results depend on the information that the regulator has on the abatement costs of the firms. To put it clearly, in order to implement the cost-minimizing program based on emission standards the regulator has to know the abatement costs of the regulated firms. This is hardly the case in the real world. Precisely, Caffera and Chávez (2010) end their paper arguing that when the regulator has imperfect information on the abatement costs of the firms it is only with tradable permits and a linear penalty structure that the regulator can surmount the informational problem and minimize the social costs of capping emissions of a pollutant to a given cap

Experiments

Surprisingly, the number of experimental works that analyze the behavior of polluting firms under different environmental policy instruments and different enforcement designs is limited. Cason and Gangadharan (2006) analyzed the efficiency of tradable permits markets when the emissions are subject to random shocks, the enforcement is imperfect, and the firms can save permits between periods. More related to this project, Anderson and Stafford (2006) present a class experiment where students act as polluting firms that choose whether to comply or not with an environmental regulation that states that they must remove the pollution of their effluent before discharging it to a river at a given fixed cost. The experiment tests the effect of increasing the probability of being monitored versus the effect of increasing the fine, keeping constant the expected fine, on the decision of the students. The results indicate that increasing the fine has a greater effect on behavior than increasing the inspection probability; a result that suggests that individuals are risk averse (Becker, 1968).

In the experiment of Anderson and Stafford (2006), however, all firms have the same costs of reducing emissions. Nevertheless, the heterogeneity of firms in terms of abatement costs is a central aspect in the relative cost-effectiveness of tradable permits. Murphy and Stranlund (2006) designed and carried out laboratory experiments to analyze the behavior of firms in emission permits markets. In their experimental design, polluting firms differ in firms with “high” marginal abatement costs and firms with “low” marginal abatement costs. In the different treatments of the experiments, these firms face three different levels of expected marginal penalty, two different levels of aggregate emissions cap and two type of initial allocation of permits: uniform and non-uniform. They find evidence of a direct and an indirect effect of an increase in the expected fine on the firms’ violations, both through an increase in the probability of monitoring and an increase in the fine. The direct effect is negative: the firms reduce their violations buying more permits. The indirect effect has an opposite sign: a higher expected penalty increases the demand for permits, its price, and by this way increases the incentive to violate. However, the authors show that the latter counter-effect is smaller in absolute magnitude than the direct effect, so the net effect of a more severe control is a decrease in violations.

Using data from the same set of experiments, Stranlund, Murphy and Spraggon (2008) found experimental evidence on the hypothesis of Malik (1990) that competitive markets for tradable permits mechanisms are cost - effective to allocate emissions even in the presence of an emissions control policy that is not able to achieve perfect compliance.

So far, the only work we are aware of that specifically studies the behavior of firms in the context of environmental regulation under different policy instruments (standards and permits transferable) and different enforcement designs is Stranlund and

Murphy (2007). These authors test the differences that according to the theory emission standards and tradable permits have with respect to the incentives to violate and the enforcement design to prevent it. In the case of emission standards, those firms with higher marginal abatement costs and/or facing lower emission standards have more incentive to violate. The regulator must therefore focus their enforcement efforts in these firms. In the case of tradable permits, because all the firms face the same incentive to violate (the permits' price) this is not true. The regulator must monitor all firms with the same frequency. Murphy and Stranlund (2007) found evidence of all these theoretical results.

The project makes a contribution providing experimental evidence on the relative cost-effectiveness of tradable permits as compared to emission standards. This depends on two issues (1) the impact that different structures of the penalty function have on the behavior of firms, and (2) the level of information that the regulator has on the abatement costs of the firms. None of these two aspects has been tested in a laboratory. This project aims to start filling this gap in our knowledge, testing the effect of different combinations of enforcement strategies and instruments on the social costs of programs for controlling emissions.

References

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UNIVERSIDAD DE MONTEVIDEO
INTERNATIONAL AFFAIRS OFFICE

December 6, 2010

To whom it may concern,

I am writing on behalf of Marcelo Caffera, whom I have known for several years as an economics professor at the Universidad de Montevideo. As director of the International Affairs Office, I work with him to coordinate scholarships, research projects and look for new opportunities to expand UM programs abroad.

Marcelo is applying for the Fulbright NEXUS Regional Scholar Program, so that he can meet and network with other researchers from all over the world. This will allow him to add depth and insight to his research in environmental economics. His knowledge is a valuable asset to Uruguay, as he is one of the few experts in this field. Marcelo's contribution to the NEXUS Program will prove valuable to not only Uruguay and the US but to other countries.

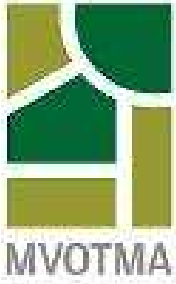
I had the opportunity to follow Marcelo's professional development in the Department of Economics at UM. His dedication and thorough research in the field of environmental economics has earned him national and international respect. In 2004, he was recognized by a National Prize in Economics. Marcelo was a three-time recipient of the "Fondo Clemente Estable", which is a prestigious research grant in Uruguay.

Marcelo is looking forward to returning to the University of Massachusetts - Amherst, where he received his Ph.D. in Resource Economics in 2004. Marcelo is currently working on a project in which he and a group of UM students simulate environmental regulations placed on businesses today. The aim of this research is to discover the economic effects of these regulations. Ultimately, Marcelo wants to raise awareness in the country on the opportunities that these so-called market-based regulations open in the environmental policy arena.

As a former Fulbright Scholar, I am certain that Marcelo Caffera will carry on the fine tradition of research and study of the Fulbright Program, which will benefit the relationship between the United States and Uruguay.

Yours sincerely,

Luisa Peirano
Director



Montevideo, December 13th 2010

To whom it may concern,

I am writing this letter to strongly recommend Marcelo Caffera to the Fulbright NEXUS Regional Scholar Program.

I met Marcelo Caffera last month when he came to an interview at my office. We at the DINAMA are in the process of hiring an environmental economist to work as a direct advisor to the Ministry and myself. Since its creation in 1990, the Ministry has never had economists formally trained in environmental economics as part of its staff. This has been, and still is, a major problem for the ministry because, on the one hand, the ministry is unable to calculate the benefits and costs of the environmental impacts of some development initiatives and environmental policies. On the other, the Ministry frequently finds itself without the right tools to discuss with the other ministries in charge the economy, such as the Ministry of Economics and Finance, Ministry of Transport, Ministry of Industry, etc. The Ministry of the Environment is nowadays pursuing a change in this respect. As part of an institutional reform at the Ministry, we are planning to change the approach we have had to environmental regulation. Specifically, we are planning to provide help the government with better information on the costs and benefits of the different economic and environmental policy measures. At the same time, the Ministry is considering the development of new environmental policy instruments based on

Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente
Dirección Nacional de Medio Ambiente
Galicia 1133
Tel: 00598 2 2 917 07 10 int. 4551
Montevideo - Uruguay

cost-effective economic incentives as a strategy to include the necessary environmental regulation in the economic development agenda of the rest of the government. For all these reasons, the Ministry is in the process of hiring an environmental economist.

As Marcelo is the only economist in the country holding a Ph.D. in Environmental Economics, and also the only one formally educated at a graduate level in this discipline, his name came out as a natural candidate to fill in the available position. I personally called Marcelo for the interview. Unluckily, Marcelo's responsibilities at the Universidad de Montevideo do not allow him to work as a part-time advisor to the Ministry of the Environment and myself. (The position offered was a six-hour-a-day position). Nevertheless, Marcelo offered himself to collaborate with the Ministry in whatever was needed from his position at the University of Montevideo. We discussed some possible ways of collaboration in the same interview. We are considering exploring a type of agreement between the University of Montevideo and the Dirección Nacional de Medio Ambiente (DINAMA). With this agreement the University of Montevideo could provide the DINAMA with: (a) training in environmental economics for its staff, (b) undergraduate and graduate students majoring in environmental economics that could serve as temporal interns in DINAMA, and specific qualified works by Marcelo and his team of research assistants.

Marcelo has demonstrated his leadership qualities and abilities for team work as a founding member of the Uruguayan Society of Ecological Economics and member of the Organizing Committee of the First Uruguayan Congress of Ecological Economics. I was invited to deliver a speech at the inauguration of the Congress, manifesting the support of the DINAMA for the Society in general and the Congress in particular. After my speech, Marcelo delivered the inaugural keynote lecture, on the lessons that can be drawn from the Latin American experience with economic instruments for pollution control. In his presentation, based on a forthcoming paper at a special issue on Latin America of the *Environment and Development Economics* journal, Marcelo

demonstrated his profound knowledge of the Latin American environmental policy in particular, and the discipline of environmental economics in general.

Marcelo's project will shed light of the very important questions of how to design environmental policy and its enforcement strategy. As Marcelo says in his article, some of the mistakes in the design of environmental policies in the past obeyed in part to the fact that they were designed based on seminal environmental economics papers. Today, the discipline offers a much safer guide to environmental policy makers. In this respect, Marcelo's project will provide us, and the regulatory community elsewhere, with the opportunity to test the theoretical guides that nowadays offers the discipline. We look forward to receiving Marcelo's advice in the design of environmental policy, based on his results.

For all these reason, I repeat here what I stated at the beginning of this letter of recommendation: I strongly recommend Marcelo Caffera to the Fulbright NEXUS Regional Scholar Program.

Please do not hesitate to contact me in case of any doubt.

Yours sincerely,



Arq. Jorge Rucks
Director Nacional de Medio Ambiente

Stakeholders

1. Arq. Jorge Rucks, Dirección Nacional de Medio Ambiente, Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente. Galicia 1133. Tel.: +598 29170710. Extensión 4551. Montevideo, Uruguay.
2. Jorge Pozzi, National Representative, (NE, Montevideo). Palacio Legislativo. Tel.: +59829248680.

Why I have selected these stakeholders

My research has convinced me that there is a substantial need of qualification in environmental economics among the regulators and policy makers in Uruguay in particular and Latin America in general. The majority of the environmental policy in the United States is still based on “command and control” or “prescriptive” instruments. Nevertheless, in the last decades it has experienced a move, slowly or not, towards economic instruments. This move was the result in part of an increase in the understanding of the economic theory behind these instruments among policy makers, legislators and other stakeholders. This was achieved by the inclusion of economics training in law schools and public policy programs at the universities. This has not yet happened in Latin America in general. It certainly has not happened in Uruguay. For this reason I have chosen these stakeholders with the hope that my project can start to fill this gap. My first stakeholder selected is Jorge Rucks, Director of the national environmental protection agency, DINAMA. As I explain in my project statement, and as Rucks mentions in his letter of reference, we are both aware of this lack, and we are exploring ways of collaborating to build capacity in the DINAMA in this respect.

I have also selected Jorge Pozzi, National Representative (NE, Montevideo) as another stakeholder. The reason is that a lot of policies are born in the parliament and at the same time there is also a profound lack of training in environmental economics among legislators (mostly lawyers) and their advisors. I thought I should select a legislator because I expect this project to serve as a first step towards the solution of this problem by disseminating the results of my research among interested legislators. Why Jorge Pozzi? I think that the major environmental problem we are facing nowadays is by far climate change. We have therefore to develop ways to put our economies in a sustainable (i.e.: low carbon) path, decreasing our emissions of greenhouse gases by developing new sources of energy. Economic instruments could play a very important role in this task. Rep. Pozzi is a member of the House of Representatives Commission on Industry, Energy and Mining, and possible president of the commission for 2011. This is reason I have selected him as a stakeholder. He has agreed.