

FROM THE PRESIDENT...

There is lots of news this time around, so let me get right to it.

• **New AERE officers were installed at the annual AERE meeting and luncheon.** When we gathered on January 4th, 1998 during the Allied Social Science Associations (ASSA) Meeting in Chicago, we welcomed Nancy Bockstael as president-elect, Ray Palmquist as vice-president, and two new members of the Board of Directors, Jon Conrad and Randy Kramer. We thanked outgoing vice president Trudy Cameron and board members Michael Hanemann and Charles Kolstad.

• **Several other transitions occurred at the annual meeting as well.** John Loomis is taking over as co-editor of the *AERE Newsletter*. Thanks are due to Jay Shogren, who previously served there. John Whitehead is the new Web Page Manager. We thanked Glenn Blomquist and Michael Newsome for starting and maintaining the Web Page. We also thanked Anna Alberini, Greg Ellis, Bill Hyde, Perry Sadorsky, and Megan Werner for service on the Program Committee. Bill Provencher was assigned to the Publication of Enduring Quality Award Committee, replacing Trudy Cameron. (Thanks, Trudy!) If you are interested in serving AERE in any capacity, please contact me. We are always in need of individuals willing to become more involved in the organization.

• **Sherwin Rosen won the Publication of Enduring Quality Award.** The paper was "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," *Journal of Political Economy* 82(1):34-55, January-February, 1974. Unfortunately, Professor Rosen could not attend the luncheon to receive the award personally, but he did write to me later to say, "Thanks ever so much for the award. It has always troubled me that I've never been able to 'see' my work and often wonder what happens to it. Mostly, nothing, I guess. So it's really great to hear that something I have done is considered to be of some use by people I respect and admire."

• **JEEM News.** Bob Deacon appears to be firmly in the saddle with the reins in his hands. Last year saw 227 new submissions, compared to 225 in 1996 and

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and 181 in 1995. The cumulative acceptance rate is 26 percent. Bob and his co-editors have maintained a very respectable turn around time on manuscripts averaging 9.4 weeks. We appreciate this as authors although as reviewers time seems to move very fast! Academic Press put out nine issues last year, rather than the usual six. This meant that as of January 1998, there was virtually no queue for accepted papers. (See the announcement concerning this on page 3) We will be back on the six issue schedule in 1998. As announced in *JEEM*, tables of contents are available free on the web. Abstracts have been available on a trial basis as well. Academic Press is now investigating making articles themselves available under a licensing arrangement.

- **Finances.** AERE is in good shape. We had a good year in 1997 and, in spite of some additional expenses anticipated for 1998, such as a 25th anniversary issue of *JEEM* and an updated *AERE Handbook and Directory*, we hope to avoid a deficit in 1998.

- **New Directory Forthcoming.** This year we will offer the *AERE Handbook and Directory* electronically. Electronic distribution will reduce directory costs by some \$7,000 and permit us to maintain more current listings. We should be ready to start distribution in a month. You will receive notice of the new directory and downloading instructions in a special mailing.

- **The Survey of Graduate Programs in Environmental and Resource Economics.** We appreciate all the work that Karen Palmer has done to update this survey. See the announcement on page 4 to find out how to obtain a copy.

- **World Congress of Environmental and Resources Economists, Venice, June 24-27, 1998.** The road to Venice has had its share of bumps and detours, but we are looking forward to a great meeting. A total of 504 papers and 24 symposia were accepted. North America and Europe are heavily represented, but there will be many papers from elsewhere as well. Our Italian hosts have some outstanding additional activities planned. With the help of California Sea Grant and our own Contributing Members Fund, AERE is granting 25 Travel Fellowships. These fellowships are being allocated on the basis of need and will go mostly to young professionals. I look forward to seeing many of you there.

- **American Agricultural Economic Association (AAEA), Salt Lake City, Utah, August 2-5, 1998.** AERE will once again join the AAEA for its annual summer meetings and will host a reception for AERE members in attendance. In addition to the AERE sessions, there are many sessions of interest to us sponsored by the AAEA. (See the listings in this newsletter.)

- **ASSA, New York City, January 3-5, 1999.** If you haven't done so, mark your calendar now. A full slate of activities is in the oven for the next ASSA meeting to be held in one of the world's great cities.

Rich Bishop
Dept. of Agricultural and Applied Economics
University of Wisconsin
Madison, WI 53706
Telephone: 608-262-8966
Fax: 608-262-4376
E-mail: bishop@aae.wisc.edu

AERE Newsletter

Co-Editors

John Loomis
Department of Agricultural and Resource
Economics
Colorado State University
Fort Collins, CO 80523-1172
Phone: 970-491-2485
Fax: 970-491-2067
E-mail: jloomis@ceres.agsci.colostate.edu

Marilyn M. Voigt
AERE
1616 P Street, N.W., Room 507
Washington, DC 20036
Phone: 202-328-5077
Fax: 202-939-3460
E-mail: voigt@rff.org

Publisher

Association of Environmental and
Resource Economists (AERE)
1616 P Street, N.W., Room 507
Washington, DC 20036

AERE ANNOUNCEMENTS

AERE WORKSHOP

In June, 1999, AERE will hold a three-day workshop on "Market-Based Instruments for Environmental Protection" at Harvard University in Cambridge, Massachusetts. The workshop, chaired by Robert Stavins, will provide an opportunity for scholars and practitioners to engage one another in a series of sessions that reflect both the scope and the depth of this active and important area of research. Venues will include panels with papers and discussants, major presentations by leading scholars, and policy-oriented roundtables. The range of market-based environmental policy instruments to be considered will include: charge systems; tradeable permits; and market-barrier reductions. Both normative and positive analysis will be featured, as well as retrospective assessments of previous and current use of market-based instruments and prospective investigations of potential new applications.

Robert N. Stavins
John F. Kennedy School of Government
Harvard University
79 John F. Kennedy Street
Cambridge, Massachusetts 02138
Telephone: 617-495-1820
Facsimile: 617-495-1635
E-Mail: robert_stavins@harvard.edu
Internet: <http://ksgwww.harvard.edu/~rstavins>

HOME PAGE

The AERE Home Page has moved to a new server:

<http://www.ecu.edu/econ/aere/>

This change was made to provide faster and more reliable service. The old AERE web pages will remain on the old server, minus updates, indefinitely at:
<http://www1.ecu.edu/~ecwhiteh/aere/aere.htm>.

In keeping up with new technology, the AERE "voluntary list of AERE members" is being converted to

a list of "AERE Members with Web Pages" on the new server. The beginnings of the list can be found here:

<http://www.ecu.edu/econ/aere/members.htm>

These pages could become an important source of research and teaching resources for environmental and resource economists. So, please send me your web site via the submittable form on the above web page or in an e-mail message to:

WhiteheadJ@mail.ecu.edu

Also, send any and all comments, suggestions, and complaints to the same address.

John Whitehead
Department of Economics
East Carolina University

JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT

Many members who subscribe to *JEEM* have been contacting the AERE Business Office inquiring about the late delivery of recent issues. (The January 1998 issue was not mailed until mid-April.) The delay resulted from the fact that Academic Press published nine issues last year, rather than the usual six, and therefore had little in the way of holdings for the recent issues.

The March 1998 issue is expected to go out in mid to late May. We expect that Academic Press will get back on schedule by the end of this Summer and regret the confusion and inconvenience of these late issues.

NOMINATIONS FOR BOARD OF DIRECTORS

This year AERE members will vote for two new members to the board of directors who will serve for three years beginning in January. The nominations are being handled by Ray Palmquist, vice president. The elections will occur in the fall of 1998. If you have a candidate whom you would like to see nominated, contact Ray before the July 1st deadline. Nominations

may also be made by the membership through petitions, each of which contains signatures of 5% of the association's members. Such petitions should be sent to arrive no later than **July 1, 1998 to:**

Raymond B. Palmquist
Department of Economics
North Carolina State University
Box 8110
Raleigh, NC 27695-8110
Telephone: 919-515-3274
Fax: 919-515-7873
E-mail: palmquist@ncsu.edu

PUBLICATION AWARD

The AERE Board of Directors will present the annual award (to co-authors if appropriate) for a publication of enduring quality that appeared at least five years prior to the year of the award. The award will be announced at the annual winter meeting luncheon in January 1999. Nominated works are to be evaluated on their seminal nature and enduring value. Place and type of publication are unrestricted, but posthumous awards will not be given. Nominees may include individuals who are not members of AERE. Evaluation of nominated works and final selection for the 1998 award will be undertaken by a committee chaired by Peter J. Parks, Rutgers University.

Nomination packages should consist of four copies each of a cover letter, a document supporting the nomination, and the publication itself. The supporting document (not to exceed three pages) should include quantitative as well as qualitative information (e.g., number of citations or copies printed). Nominations should be sent to arrive **no later than September 1st to:**

Professor Peter J. Parks
Department of Agricultural, Food and Resource
Economics
Cook College, Rutgers University
55 Dudley Road
New Brunswick, NJ 08901-8520
Telephone: 732-932-9161 x46
Fax: 732-932-8887
E-mail: parks@aesop.rutgers.edu

SURVEY OF GRADUATE PROGRAMS IN ENVIRONMENTAL AND RESOURCE ECONOMICS

Over the past several years, AERE has conducted a periodic mail survey of faculty representatives from graduate programs in environmental and resource economics as a means of collecting information to provide to potential graduate students and other interested parties. The types of information collected include lists of faculty members, size of program, extent of course offerings, financial aid statistics, and thesis titles and job placements of recent graduates. The results of the survey have been made available in hard copy form to all who request them and, in recent years, they have been posted on the AERE web site, now at <http://www.ecu.edu/econ/aere/>. At the current time, information on 65 graduate programs is included.

Beginning in late May, representatives of graduate programs in environmental and natural resource economics will be able to respond electronically to the AERE graduate program survey. The entire survey questionnaire will be posted as an electronic form on the AERE web site. This means that information collected in this survey can be updated in a more timely fashion and it should make it easier to respond to the survey. To facilitate comparability and avoid duplication, survey responses submitted to the AERE web site will be reviewed by Karen Palmer, AERE Secretary, before being posted to the AERE web page. We request that only one person from each academic program take responsibility for responding to the survey and keeping responses updated. If you have questions about the survey, **please contact Karen Palmer by telephone: 202-328-5106 or e-mail: palmer@rff.org.**

AERE BUSINESS OFFICE

For AERE membership information or inquiries about subscriptions to *JEEM*, contact Marilyn M. Voigt, AERE Executive Secretary, at telephone: 202-328-5077 or e-mail at: voigt@rff.org.

For AERE membership applications, refer to the AERE Home Page at:

<http://www.ecu.edu/econ/aere/>
or contact Marilyn (see above).

CALLS FOR PAPERS / COURSE OFFERINGS

AGRICULTURAL AND RESOURCE ECONOMICS REVIEW

The *Agricultural and Resource Economics Review* (ARER) will publish papers on the theme "Agricultural and Resource Dimensions of Global Environmental Change" as a special section of its Spring 1999 issue. The agricultural and natural resource sectors of the economy will be both impacted by as well as contribute to environmental change. Thus, both impact assessment and contribution papers are relevant. In the papers, authors are expected to identify and examine issues, policies, and/or research methods of interest to global environmental change. Idea papers are welcomed as well as theoretical and empirical work. Papers will be subject to blind review. There will be a page charge on published articles. General areas that might be addressed by author(s) include identification and measurement of emerging environmental change issues, evaluation of mitigation policies, analysis of linkages and tradeoffs between environmental quality goals and international, national, regional, state, or community economic growth and development. Four copies of each manuscript should be submitted with a postmark **on or before October 1, 1998** to:

Harry M. Kaiser, Incoming Editor, ARER
Department of Agricultural Economics
349 Warren Hall
Cornell University
Ithaca, New York 14853-7801

Submissions by electronic mail to: hmk2@cornell.edu will also be accepted by the above date. Manuscripts should be sent as an attachment and should be in Microsoft Word or WordPerfect format in a Windows environment.

ALLIED SOCIAL SCIENCE ASSOCIATIONS

The 1999 Winter meeting of the Allied Social Science Associations (ASSA) will be held in New York City, New York on January 3rd-5th. AERE will sponsor six contributed papers sessions of three to four papers each. Those wishing to have a paper considered for AERE's sessions should send six copies of a 1-3 page abstract. Send submissions **by May 20, 1998** to:

John K. Horowitz
Dept. of Agricultural and Resource
Economics
University of Maryland
College Park, MD 20742-5535
Telephone: 301-405-1273
Facsimile: 301-314-9091
E-mail: horowitz@arec.umd.edu

Proposals for complete sessions are also invited. Organizers of proposed sessions should submit abstracts of papers following the above instructions. Papers may be accepted or rejected on an individual basis unless the organizer specifically requests the session be considered only in its entirety.

Due to limited resources, those wishing to have receipt of their submissions must also submit a self-addressed, stamped postcard.

THE WORLD BANK

The World Bank will organize a two-day workshop in late October 1998 on "The Political Economy of Water Pricing Implementation." The Bank is soliciting contributed papers specifically addressing the following issues:

- formulation and implementation of pricing reforms and other pertinent experiences
- innovative approaches in the area of water pricing reform implementation
- the political economy of water pricing implementation, including:

- specific experiences

new theories or methodologies in the area of water and other relevant resources.

Recent concerns regarding increased water scarcity and its deteriorating quality have compelled policymakers to explore new approaches to water management. These have included water pricing reforms to encourage the efficient allocation and conservation of existing water resources. However, experience suggests that political pressures can affect the implementation of water pricing reforms and divert policymakers from their original objectives.

In the last decade, many countries have been in the process of reforming their water sector. In addition, the interest in water management has also led to a surge in theoretical and empirical research in this area, particularly in the fields of economics, political science and institutional studies. This workshop provides an opportunity for policymakers, practitioners and researchers in the study of water utilization and pricing to exchange ideas and share their experiences on this important topic.

Please submit three copies of your paper **by June 15, 1998** to: Liliana Monk, Rural Development Department, The World Bank, 1818 H Street, NW, Room S-0218, Washington, DC 20433; E-mail: lmonk@worldbank.org.

For additional information please contact:
Arial Dinar at telephone: 202-473-0434; E-mail: adinar@worldbank.org.

ENVIRONMENTAL ECONOMICS FOR DEVELOPMENT POLICY COURSE

The Economic Development Institute (EDI) of the World Bank is pleased to announce the launching of a core course, *Environmental Economics for Development Policy*, to be held in Washington, DC from July 6-17, 1998. EDI core courses are activities in areas of critical importance for the development and policy-making processes where the World Bank has a comparative advantage and interest. In terms of their content, they are at the cutting edge, utilizing the most current knowledge of policies and practices, well-tested teaching materials, and renowned trainers.

Objective: The two-week course will introduce current thinking and best practices in using environmental economics to address resources and environmental problems at the macro, sector and project levels based on the World Bank knowledge in applied environmental economics. The participants are expected to: strengthen their skills in analyzing new policies, programs and projects for sustainable development; build environmental awareness; and train and advise various types of audiences such as ministers, parliamentarians, government officials, managers, journalists, clergy, NGOs, and students among others on specific environmental themes and issues of relevance to their respective countries.

Content: General principles, techniques, case studies, publications, and software will be used to illustrate six modules: (i) Identification and Analysis of Environmental Problems; (ii) Setting Priorities; (iii) Contemplating Policy Responses; (iv) Valuing Environmental/Health Impacts; (v) Deciding on Policies, Programs & Projects; and (vi) Monitoring & Evaluation.

Faculty: A core team from the World Bank, and internationally renowned academics.

Audience: Advisors, public and private sector professionals, NGOs and academics.

Qualifications: Background in economics, English proficiency, and computer literacy.

Registration Fee: US \$1,850 per participant from World Bank client countries, and US \$3,600 from the private sector and all other countries. Fee includes tuition, lodging, health insurance, training materials and use of computers. Travel and subsistence are additional.

Dates to remember:

May 15th: Deadline to submit application with CV

May 22nd: Notification of acceptance

June 1st: Registration deadline for accepted applicants

July 6-17th: Course held in Washington, D.C.

To Apply:

Request an application form by e-mail: EEDP_Files@worldbank.org or fax: 1-202-676 0959 or download a copy from: www.worldbank.org/edi/eedp.

MEETINGS AND CONFERENCES

AMERICAN AGRICULTURAL ECONOMICS ASSOCIATION ANNUAL MEETING

**August 2 - 5, 1998
Salt Lake City, Utah**

The American Agricultural Economics Association (AAEA) will hold its annual 1998 meeting in Salt Lake City, Utah on August 2 - 5, 1998. Pre-registration booklets have been mailed to all AAEA members. If you are not a member of the AAEA and would like to obtain a copy of the booklet, call the AAEA business office at: 515-233-3345 or send a request by e-mail to: nancy@aaea.org. Additional information is also available at www.aaea.org.

A reception for AERE members attending the AAEA meeting will be held on Tuesday, August 4th, at the Marriott Hotel in Grand Ballroom C from 5:30 to 7:00 p.m.

AERE Contributed Papers Sessions and Selected Papers Sessions are listed below. **(Please check the program schedule for times and room assignments.)**

AERE Contributed Papers Sessions

Valuation Through Revealed and Stated Preferences

Chair: Cathy Kling, Iowa State University

Papers: 1. "Combining Revealed and Stated Preferences for Environmental Valuation: Drought Mitigation Benefits in Manggarai Watersheds of Eastern Indonesia," **Author:** Subhrendu Pattanayak, Duke University; **Discussant:** James Shortle, The Pennsylvania State University.

2. "Household Responses to New Opportunities in Non-Timber Forest Product Markets," **Authors:** Erin Sills, North Carolina State University and Tom Holmes,

U.S. Forest Service; **Discussant:** Rimjhim Aggarwal, University of Maryland.

3. "A Nested Logit Model of Trout Fishing with Applications to Climate Change," **Authors:** SoEun Ahn and Ray Palmquist, North Carolina State University; **Discussant:** Cathy Kling, Iowa State University.

4. "Combining Revealed and Stated Preferences to Evaluate In-Kind Transfers for Natural Resource Damages: An Application to Saltwater Fishing," **Authors:** Doug MacNair and Janet Lutz, Triangle Economic Research; **Discussant:** Jim Opaluch, University of Rhode Island.

The Workings of Contingent Valuation

Chair: Alan Randall, Ohio State University

Papers: 1. "A Constructive Approach to Air Quality Valuation in Korea," **Authors:** Seung-Jun Kwak, Korea University; Seung-Hoon Yoo and Tai-Yoo Kim, Seoul National University; and Woo-Chang Cho, KEPCO; **Discussant:** To be determined.

2. "Usefulness of Contingent Valuation Results – Welfare and Policy Implications," **Author:** Joan Poor, University of Nebraska, Lincoln; **Discussant:** Casey Van Kooten, University of British Columbia.

3. "Laboratory Evidence on the Relationship Between Biases in Contingent Valuation Surveys," **Authors:** Helen Neill, University of Nevada, Las Vegas and Laura Osborne, Georgia State University; **Discussant:** Alan Randall, Ohio State University.

Examining Solutions to Environmental Problems

Chair: John K. Horowitz, University of Maryland

Papers: 1. "The Marginal Cost of Carbon Sequestration in Global Forests," **Authors:** Brent Sohngen, Ohio State University; Robert Mendlesohn, Yale University; and Roger Sedjo, Resources for the Future; **Discussant:** To be determined.

2. "The Efficiency of Transferable Property Rights for Common Property Resource Regulation: A Theory or a Reality?" **Author:** Sylvia Brandt, University of California, Berkeley; **Discussant:** Quinn Weninger, Utah State University.

3. "A Tax versus a Performance Standard in the U.S. Pulp and Paper Industry: Implications for Industrial Environmental Policy in the United States," **Authors:** Bahar Celikkol and David Abler, The Pennsylvania State University; **Discussant:** John K. Horowitz, University of Maryland.

4. "Sustainability: A Societal Objective with Sector-Level Implications," **Authors:** Richard T. Woodward, Texas A&M University, and Richard C. Bishop, University of Wisconsin, Madison; **Discussant:** Gabriel Lozada, University of Utah.

Selected Papers Sessions

Each summer, numerous papers of interest to AERE members are presented outside of AERE Sessions under the direction of the Selected Papers Committee of the AAEA. As topic leaders for the 1998 Selected Papers Committee, we felt that the sessions listed below would be of interest to AERE members. Times and locations of the sessions will be posted on the AAEA home page at: <http://www.aaea.org>.

Madhu Khanna, University of Illinois
Amy Gautan, NMFS
Jay Coggins, University of Minnesota
Laura Osborne Taylor, Georgia State University

SP-14 Evaluating Local Efforts to Conserve Resources

Moderator: Leroy Hushak
Ohio Sea Grant College Program

Papers: 1. "An Analysis of Factors Associated with Composting Behavior at the Household Level," William Park, Roland Roberts, and Kevin Lamons, The University of Tennessee.

2. "Fishery Co-Management: The Case of Punta Allen Spiny Lobster Fishery," Kathy Cochran, University of Rhode Island.

3. "Effects of Amendments To The Safe Drinking Water Act On Local Government Finance and Rural Residents in New York," Todd Schmit, Cornell University; Leo Tsao, Cornell Law School; Richard Boisvert, Cornell University.

4. "A Computable General Equilibrium Approach to Surface Water Allocations Policy in Rural Nevada,"

Chang Seung, University of Nevada; Thomas Harris, and Rangesan Narayanan, University of Nevada-Reno.

Discussant: Dennis Fisher, Texas A&M University

SP-15 Water Allocation Policies and Optimal Water Use

Moderator: Kathleen Segerson
University of Connecticut

Papers: 1. "Optimal Temporal and Spatial Scheduling of Arid-Region Water Supply Projects with Nonrenewable Groundwater Stocks," James Booker, Alfred University; R. G. Taylor, University of Nebraska; and Robert Young, Colorado State University.

2. "Drought-Contingent Water Pricing in a Conjunctive Use System," Eric Schuck and Gareth Green, Washington State University.

3. "A Comparative Institutional Analysis of Emerging Markets in Water: the Central Valley Project and the Colorado-Big Thompson," David Sunding and Janis Olmstead, University of California-Berkeley.

4. "Agriculture and Ecosystem Restoration in South Florida: Assessing Tradeoffs from Water Storage Development in the Everglades Agricultural Area (EAA)," Marcel Aillery, USDA/ERS/RED, Robbin Shoemaker, USDA/ERS and Margriet Caswell, USDA/ERS.

Discussant: Hayri Onal, University of Illinois

SP-16 Impact of Institutions on Water Use

Moderator: Donna Lee, University of Florida

Papers: 1. "An Evaluation of Water Banking Policy and Instream Flow in the Snake River," John O'Connor and Gareth Green, Washington State University.

2. "An Economic-Hydrologic Modeling Approach for Assessing Alternative Institutional Innovations for Coping with Drought on an Interstate River," Frank Ward, New Mexico State University; Marshall Frasier, Colorado State University; James Booker, Alfred University; Ronald Lacewell, Texas A&M University; John Ellis, Texas A&M University; Robert Young, Colorado State University.

3. "Irrigation District Adoption of Water Conserving Rate Structures," R. G. Taylor, University of Nebraska; Tom McGuckin, New Mexico State University; Ari Michelsen and Ray Huffaker, Washington State University.

4. "A Stochastic Dynamic Model of Investment: Modern Irrigation Technology & Emerging Markets in Water," Janis Olmstead and David Zilberman, University of California-Berkeley.

Discussant: Farhed Shah
University of Connecticut

SP-17 Sustainable Resource Management

Moderator: Madhu Khanna, University of Illinois

Papers: 1. "Dynamic Economic Analysis of a Residue Management System in Cotton," Krishna Paudel and Luanne Lohr, University of Georgia.

2. "Sustainable Resource Management: A Methodology for Analysis," Jennie Popp and Dana Hoag, Colorado State University.

3. "Optimal Use of an Ex Situ Collection of Genetic Resources: The Case of Wheat," Douglas Gollin, Williams College; Melinda Smale, and Bent Skovmand, CIMMYT.

4. "The Evolution of Agricultural Soil Quality: A Methodology for Measurement and Some Land Market Implications," Kwansoo Kim, Bradford Barham, and Ian Coxhead, University of Wisconsin-Madison.

Discussant: Daniel Rondeau, Cornell University

SP-18 Resource Management Issues

Moderator: Bhavani Shankar, University of Illinois

Papers: 1. "Empirical Analysis of Pastoral Migration Decisions: Gabra Herders in Northern Kenya," John McPeak, University of Wisconsin-Madison.

2. "Optimal Management of Multi-Value Renewable Resources: An Application to the African Elephant," William Sutton and Lovell Jarvis, University of California-Davis.

3. "An Economic Analysis of Thoroughbred Breeder/Owner Subsidy Policies," J. Shannon Neibergs and Richard Thalheimer, University of Louisville.

4. "The Dynamics of Reintroducing, Supplementing and Controlling Endangered Predator Populations," Daniel Rondeau, Cornell University.

Discussant: Stephen Hamilton, Kansas State Univ.

SP-19 Land Use, Agricultural Productivity and Prices

Moderator: Patricia Norris
Michigan State University

Papers: 1. "Non-parametric Environmental Adjusted Productivity (EAP) Measures: Nebraska Agriculture Sector," Shaik Saleem and Richard Perrin, University of Nebraska-Lincoln.

2. "Agriculture and Development: An Hedonic Decomposition of Farmland Values in Florida," David Westenbarger, USDA/ERS.

3. "Capitalization of Farmland Preservation Programs into Farmland Prices," Cynthia Nickerson and Lori Lynch, University of Maryland.

4. "Conservation Tillage in U.S. Corn Production: An Economic Appraisal," John Day and Carmen Sandretto, USDA/ERS.

Discussant: Elizabeth Marshall
University of Minnesota

SP-20 Agriculture and Environmental Policy

Moderator: Elizabeth Marshall
University of Minnesota

Papers: "Using Setback Requirements as an Economic Incentive to Reduce Livestock Waste Odors," Ronald Fleming, University of Kentucky.

2. "Tillage and Nutrient Management Decisions by U.S. Corn Producers--Results from the 1996 USDA Agricultural Resources Management Study," Lee Christensen, Stan Daberkow, and Noel Uri, USDA/ERS.

3. "The Environmental Effects of Freedom to Farm," Bruce Babcock, Iowa State University (ISU), Terrance Hurley, ISU, JunJie Wu, Oregon State University and Paul Michell, ISU.

4. "Agricultural and Environmental Policy Goals: A Multitask Principle-Agent Solution," M. H. C. Komen, Wageningen Agricultural University.

Discussant: Cynthia Morgan
University of Minnesota

SP-21 Quality of Surface Water

Moderator: Steven Deller, University of Wisconsin

Papers: 1. "Cleaner Technology Investments in the Pulp and Paper Industry," Leigh Maynard and James Shortle, The Pennsylvania State University;

2. "Analysis of the Effects of Environmental Regulation on Pulp and Paper Industry Structure," Irma Gomez, ITESM; H. Alan Love and Diana Burton, Texas A&M University.

3. "A Cost-Effectiveness Analysis of Actions to Reduce Stream Temperature at the Watershed Scale," Sian Mooney, Trade Research Center-Montana State University and Ludwig Eisgruber, Oregon State University.

4. "A Multiple Organic Pollutant Simulation/Optimization Model of Wastewater Loading to a Riverine Environment," Jeffrey Carmichael, The Pennsylvania State University.

Discussant: David Abler, Penn State University

SP-22 Efficiency of Environmental Policy

Moderator: Cynthia Morgan
University of Minnesota

Papers: 1. "Taxation, Fines, and Producer Liability Rules: Efficiency and Market Structure Implications," Stephen Hamilton, Kansas State University.

2. "Does Compensation Paid for Regulatory Takings Result in Efficiency Losses and Moral Hazards?: The Search for Empirical Evidence," Marie Truesdell and John Bergstrom, University of Georgia.

3. "Environmental and Natural Resource Policy and the Optimal Dispersion of Property Rights," Shi-Ling Hsu and Marca Weinberg, University of California-Davis.

4. "The Relative Efficiency of Voluntary vs. Mandatory Environmental Regulations," JunJie Wu, Oregon State University; Bruce Babcock, Iowa State University.

5. "Electricity Deregulation: What's in Store for the Environment?" Alan Levy, U.S. Food and Drug Administration (FDA); Mario Teisl, University of Maine; Brian Roe, FDA; Dave Moskovitz and Tom Austin, Regulatory Assistance Project.

Discussant: Richard Woodward, Texas A&M

SP-23 Information and the Control of Nonpoint-Source Pollution

Moderator: Marca Weinberg
University of California-Davis

Papers: 1. "Nonpoint Source Pollution Control Under Incomplete and Costly Information," Y. Hossein Farzin and Jonathan Kaplan, University of California-Davis.

2. "Optimal Regulation under Asymmetric Information and Risk Aversion: Application to Agricultural Nitrate Pollution," Philippe Bontems and Alban Thomas, INRA-ESR, Toulouse, France.

3. "Ecological-Economic Modeling on a Watershed Basis: A Case Study of the Cache River of Southern Illinois," Jeff Beaulieu, Dave Bennett, Steven Kraft, and Raja Sengupta, Southern Illinois University.

4. "Optimal Information Acquisition from Noisy Nonpoint Source Pollution Data," Jonathan Kaplan and Richard Howitt, University of California-Davis.

Discussant: Jun Jie Wu, Oregon State University

SP-24 Incentive-Based Pollution Policies

Moderator: Jared Creason
U.S. Environmental Protection Agency

Papers: 1. "The Design of Ambient Taxes under Heterogeneous Expectations and Risk-Aversion," Richard Horan, USDA/ERS; James Shortle and David Abler, The Pennsylvania State University.

2. "Have Real World Incentive Based Pollution Policies Been Over Sold? The Case of Nonpoint Source Pollution," Kurt Schwabe, Ohio University and V. Kerry Smith, Duke University.

3. "Taxes vs. Standards under a Truncated Input Base," Richard Horan and Roger Claassen, USDA/ERS.

4. "Trade-off Between Economic Efficiency and Producers' Equity: A Case Study of Tradable Permits for Controlling Chemical Pollution in a Watershed," Hayri Onal, Kenneth Algozin, Madhu Khanna, and Murat Isik, University of Illinois.

Discussant: Vincent Smith
Montana State University

SP-25 Market-Based Control of Nonpoint Pollution

Moderator: Richard Adams
Oregon State University

Papers: 1. "Tradeable Permits for Controlling Nitrate Pollution of Domestic Groundwater Supplies," Cynthia Morgan, Vernon Eidman, and Jay Coggins, University of Minnesota.

2. "Point/Nonpoint and Nonpoint/Nonpoint Trading Rules," James Shortle, The Pennsylvania State University; Richard Horan, USDA/ERS; David Abler, Penn State, and Marc Ribaud, USDA/ERS.

3. "Nitrogen Sources and Gulf Hypoxia: Potential for Point-Nonpoint Trading," Marc Ribaud, Ralph Heimlich, and Mark Peters, USDA/ERS.

4. "Green Insurance Versus Green Payments for Nonpoint Source Pollution Control," Paul Mitchell, Iowa State University.

Discussant: Gerald Shively, Purdue University

SP-26 Pesticides and Environmental Quality

Moderator: Michele Marra
North Carolina State University

Papers: 1. "Financing the Disposal of Unwanted Agricultural Pesticides," Lowell Gunter and Terence Centner, University of Georgia.

2. "The Determinants of Pesticide Registration for Food Crops," Claude Courbois, North Carolina State University and International Food Policy Research Institute.

3. "A New Measure of Integrated Pest Management: The Case of Corn," Jorge Fernandez-Cornejo and Sharon Jans, USDA/ERS.

4. "The Environmental Effect of Adopting IPM: The Case of Peach Growers," Jennifer Ferraioli and Jorge Fernandez-Cornejo, USDA/ERS.

Discussant: Terrance Hurley, Iowa State University

SP-27 Frontier Production Technologies and the Environment

Moderator: Munisamy Gopinath, Oregon State

Papers: 1. "Non-Parametric Approaches to Environmentally Sensitive Analysis of Economic Performance: Technical Change and Productivity Growth in the Canadian Pulp and Paper Industry, 1959-1994," Atakelty Hailu and Terry Veeman, University of Alberta.

2. "Profitability Under Alternative Nonpoint Emission Control Policies," Gerald Whittaker, USDA/ERS.

3. "Sustainable Efficiency of Dutch Dairy Farms; a Parametric Distance Function Approach," Stijn Reinhard, Agricultural Economic Research Institute, The Hague and Geert Thijssen, Wageningen Agricultural University.

4. "Estimation of Shadow Prices of Undesirable Outputs: An Application to UK Dairy Farms," David Hadley, University of Nottingham.

Discussant: Steven Deller, University of Wisconsin

SP-28 Contingent Valuation and International Applications

Moderator: Helen Neill
University of Nevada-Las Vegas

Papers: 1. "Heterogeneous Preferences Regarding Global Climate Change," David Layton, University of California-Davis and Gardner Brown, University of Washington.

2. "Estimation of Existence Values using Discrete Choice Conjoint Analysis and a Comparison with Contingent Valuation Estimates," Kimberly Rollins, University of Guelph; Don Anderson, Stat Design; Wolfgang Haider, Simon Fraser University; Len Hunt, Ontario Ministry of Natural Resources; and Audrey Lyke, Connecticut.

3. "Willingness to Pay for Drinking Water in Urban Areas of Developing Countries," Marcia Rosado, University of Maryland.

4. "Willingness to Pay for Environmental Services Among Slash-and-Burn Farmers in the Peruvian Amazon: Implications for Deforestation and Global Environmental Markets," Joyotee Smith, CIFOR; Susana Mourato, CSERGE; Erik Veneklaas, CIAT; Ricardo Labarta, ICRAF; Keneth Reategui, CIAT; Glendy Sanchez, CIAT.

Discussant: Kevin Boyle, University of Maine

SP-29 Applications of Stated Preference Methods

Moderator: Doug MacNair
Triangle Economic Research

Papers: 1. "Combining Revealed and Stated Preferences for Recreation Demand: An Application Using the Fourier Flexible Form," Sabina Shaikh, and Douglas Larson, University of California-Davis.

2. "Effect of Risk Perception on Willingness to Pay for Improved Water Quality," Renu Sukharomana, University of Nebraska and Raymond Supalla, University of Nebraska-Lincoln.

3. "Differentiating 'Nonpositive' Responses in Contingent Valuation: A Multinomial Logit Approach," Jack Isaacs, Northeastern Louisiana University and E. Jane Luzar, Louisiana State University.

4. "Assessing Opt-Out Formats for Discrete-Choice Stated Preferences: Results From a Saltwater Angling

Survey," Melissa Ruby, Kristy Mathews, and F. Reed Johnson, Triangle Economic Research.

Discussant: Frank Lupi, Michigan State University

SP-30 Topics in Resource Valuation and Management

Moderator: John Bergstrom, University of Georgia

Papers: 1. "Evaluating the Benefits of Reductions in Fecal Coliform Bacteria Levels: A Water Quality Hedonic," Christopher Leggett and Nancy Bockstael, University of Maryland.

2. "Farmer Willingness to Pay for Herbicide Safety Characteristics," Nicole Owens, U.S. Environmental Protection Agency; Scott Swinton and Eileen Van Ravenswaay, Michigan State University.

3. "Revenue Risk and Fishery Choice: An Application to Bering Sea/Aleutian Islands Trawl Fisheries," Joseph Terry, Alaska Fishery Science Center; Douglas Larson and William Sutton, Univ. of California-Davis.

4. "Jobs or Salmon? The Reliability of Nonuse Stated Preference," Kristy Mathews and F. Reed Johnson, Triangle Economic Research.

5. "Multispecies Revenue Function Estimation for North Pacific Groundfish Fisheries," Joseph Terry, Alaska Fishery Science Center; Douglas Larson and Sabina Shaikh, University of California-Davis.

Discussant: Anna Alberini, University of Colorado

SP-31 Advances in Recreation Demand Modeling

Moderator: Catherine Kling, Iowa State University

Papers: 1. "Increasing at an Increasing Rate: The Potential Convexity of Discrete-Choice Welfare Measures," Frank Lupi, Michigan State University.

2. "Valuing Time in Recreation Demand Models," Peter Feather, USDA/ERS; W. Douglass Shaw, University of Nevada.

3. "Using Stable Preferences to Value Leisure Time," Sabina Shaikh, University of California-Davis.

4. "Estimating Endogenous Nesting Structures in Random Utility Models: An Application to Saltwater Fishing," Doug MacNair and Janet Lutz, Triangle Economic Research.

Discussant: Nicholas Flores, University of Colorado

SP-74 Pricing of Environmental Goods: Measurement and Efficiency Issues

Moderator: Ashok Mishra, USDA/ERS

Papers: 1. "Measuring the Benefits of Air Quality Improvement: A Spatial Hedonic Approach," Chongwon Kim, Korea Research Institute for Human Settlements; Tim Phipps and Luc Anselin, West Virginia University.

2. "The Value of Open Spaces for Residential Land Prices & Land Use Change: A Hedonic & Duration Model Analysis," Jacqueline Geoghegan, Clark University and Nancy Bockstael, University of Maryland.

3. "'Green Box' Measures for Agricultural Support: How Decoupled Can They Really Be? An Investigation within SAM and CGE Frameworks," Serdar Sayan and Ela Tin, Bilkent University.

4. "Long-Run Inefficiency of Block-Rate Pricing," Ziv Bar-Shira and Israel Finkelshtain, Hebrew University of Jerusalem.

Discussant: Daniel Phaneuf, Iowa State University

SP-77 Seeing the Forest for the Trees: Public and Private Forest Management

Moderator: Brent Sohngren
The Ohio State University

Papers: 1. "Forest Cover under Varying Public and Private Ownership Mixes: Application to the Effects of Trade Liberalization in Mexico," Jeffrey Prestemon, USDA/Forest Service.

2. "Forest or Famine: A Dynamic Model and Empirical Investigation of Farm-Level Decisions to Convert Tropical Forest to Pasture," Kimberly Rollins, University of Guelph; Richard Bishop, University of Wisconsin--Madison; Andrew Kellock, The Scotia Bank; Michael Jay, Environment Canada.

3. "Public Forest Resource Management in the Philippines: Timber Production, Externalities, and Agricultural Expansion," Marissa Garcia, University of Hawaii-Manoa / East-West Center and Donna Lee, University of Florida.

4. "Determinants of Non-timber Value in Northern Hardwoods: A Framework For Forest Resource Accounting," Scarpa Riccardo and Joseph Buongiorno, University of Wisconsin-Madison.

Discussant: David Lee, Cornell University

SP-78 Property Rights and Regulation

Moderator: K. William Easter
University of Minnesota

Papers: 1. "A Model of Regulatory Compromise Between Environmental Regulators and Landowners," Shi-Ling Hsu, University of California-Davis.

2. "Preemptive Habitat Destruction and the Endangered Species Act: The Case of the Red-Cockaded Woodpecker," Jeffrey Michael, North Carolina State University.

3. "Investment Valuation Tools for Responsible Resource Use under Changing Property Rights Regimes," Ellen Waible, Oregon State University.

4. "Measuring Regulatory Climate: A Property Rights-based Assessment of U.S. Aquaculture," Ferdinand Wirth and E. Jane Luzar, Louisiana State University.

Discussant: Keith Wiebe, USDA/ERS

SP-79 Modeling Optimal Land Use Decisions

Moderator: Sabrina Ise
U.S. Environmental Protection Agency

Papers: 1. "Optimal Cropland Degradation with Reversible and Irreversible Components," Jeffrey Hopkins, Gary Schnitkey, Luther Tweeten, and Brent Sohngen, The Ohio State University.

2. "Economic Impacts of Edge Effect Externalities on Land Use Decisions," Dawn Parker, University of California-Davis.

3. "Resolving Land-Use Conflicts: A Game-Theoretic and Empirical Model," Joshua Duke, University of Wisconsin-Madison.

4. "Equity and Efficiency in Tropical Land Management Policy," Elizabeth Marshall, University of Minnesota.

Discussant: Jacqueline Geoghegan
Clark University

SP-80 New Hooks in Fisheries: Innovative Models and Management

Moderator: Amy Gautam
National Marine Fisheries Service

Papers: 1. "A Discrete Choice Model of Fishing Vessel Buyback Program," Xiaolong Zhang, Rutgers University and Ching-Ta Chuang, National Taiwan Ocean University.

2. "Ecolabelling Seafood for Sustainable Production: Implications for Fisheries Management," Cathy Wessells and Eyjolfur Gudmundsson, University of Rhode Island.

3. "Limited Access and Vessel Heterogeneity in Atlantic Pelagic Fisheries: Evaluating Draft Amendment 1 of the Atlantic Swordfish FMP," Donna Lee, Sherry Larkin, and Charles Adams, University of Florida.

4. "A Spatial Model of Fishing Behavior Applied to the Eastern Tropical Pacific Tuna Industry," Robert Hicks, National Marine Fisheries Service.

Discussant: James Wilen
University of California-Davis

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ESSAYS

Environmental Tax Policy Using a Two-Part Instrument

Don Fullerton*

One important goal of tax policy is economic efficiency. In some cases, this requires raising revenue and avoiding changes in relative prices that may distort taxpayer behavior and create “excess burden.” In other cases, however, economic efficiency might require changes in relative prices: for example, taxing the “negative externalities” from alcohol, tobacco, and disposal of household or industrial waste. (Negative externalities include injuries, second hand smoke, and aesthetic costs.)

A second goal of tax policy is administrative efficiency. This is often best achieved by taxes on market transactions, for which the tax base can be measured and verified most easily. Taxes can apply to wages paid by an employer, interest paid by a bank, dividends reported by a broker, and the sale of cigarettes and alcohol as reported by retail establishments.¹

But what about disposal of household and industrial waste? To achieve economic efficiency, these activities should be taxed, but they are often not market transactions that can be verified by a third party. In such cases, a “two-part instrument” might resolve the conflict.² Instead of directly taxing waste, a two-part instrument

would raise the relative price of waste indirectly through both a tax and a subsidy on other activities that *are* market transactions. This policy combination can change relative prices in the same way as a tax on waste, but each tax or subsidy can be verified by invoices. Thus, the two-part instrument might better achieve both economic and administrative efficiency.

In the next sections, I clarify the theory behind this idea and provide a few examples. The following sections consider interactions with other taxes and the issue of scarcity rents.

Any Tax Can be Set to Zero

Taxpayers long have known that government can tax them both when they earn and again when they spend; most economists recognize that one such tax is redundant. Generally speaking, a tax that takes half of your gross paycheck is equal to a tax that doubles the price of everything you buy. As a consequence, for any system of tax rates on different commodities, any one tax can be set to zero. Revenue can be raised by a tax on all forms of income. Then all the desired relative prices of the different commodities can be achieved by a set of taxes and subsidies on goods other than the untaxed good.³ One simple example is a political promise not to tax cigarettes, which can be circumvented by a tax on all income and a subsidy to all goods except cigarettes.

The best actual example of a two-part instrument is a deposit-refund system. A tax is first paid at the store on some item(s), and then returned if and when the item (or its container) is recycled. The result is a tax that remains on the good when it is not recycled. But this idea can be applied much more generally. Even the U.S. income tax operates on such a principle, using a withholding tax collected by employers that may exceed the tax due. If so, a refund is paid if and when the taxpayer files properly.

*Don Fullerton is Addison Baker Duncan Professor of Economics at the University of Texas at Austin and a research associate in the NBER's Program in Public Economics.

¹ For a discussion of tax systems that optimize administrative costs as well as tax rates, see J. Slemrod, “Optimal Taxation and Optimal Tax Systems,” *Journal of Economic Perspectives* 4, 1 (Winter 1990), pp. 157-78.

² The terminology of a “two-part instrument” first appears in D. Fullerton, “Environmental Levies and Distortionary Taxation: Comment,” *American Economic Review* 87, 1 (March 1997), pp. 245-51.

³ These arguments are formalized in D. Fullerton and A. Wolverton, “The Case for a Two-Part Instrument: Presumptive Tax and Environmental Subsidy,” NBER Working Paper No. 5993, April 1997.

Other Examples

Suppose that a government wants to tax all household waste disposal in order to reduce landfill costs and negative externalities (like truck noise, odor, and groundwater contamination). A tax per bag of garbage might be difficult to implement, administer, and enforce.⁴ It also can induce illegal dumping. Under some conditions, however, the jurisdiction can: tax everything bought at the store, through a general sales tax; provide a partial subsidy to all regular garbage, through free curbside collection; and provide a higher subsidy to all recycling.⁵ This combination leaves a partial tax on garbage, but it leaves the highest rate of tax on anything *not* put into regular garbage or recycling--that is, anything dumped illegally.⁶

Second, suppose policymakers want to tax some polluting emissions from a factory, and cannot measure those emissions through such devices as the "continuous emissions monitoring" (CEM) equipment used on large power plants. Ease of measurement and enforcement may vary for toxic or nontoxic emissions that are gaseous, liquid, or solid. (The emissions can be viewed as a necessary input to production with its own downward-sloping marginal product schedule, since

⁴ A particular garbage pricing program is studied for a sample of households in D. Fullerton and T. Kinnaman, "Household Responses to Pricing Garbage by the Bag," *American Economic Review* 86, 4 (September 1996), pp. 971-84.

⁵ D. Fullerton and T. Kinnaman, "Garbage, Recycling, and Illicit Burning or Dumping," NBER Reprint No. 2024, January 1996, and *Journal of Environmental Economics and Management* 29, 1 (July 1995), pp. 78-91.

⁶ The equivalence is broken if the good is taxed upon purchase in one jurisdiction and recycled in a different jurisdiction without a matching policy. Thus the policy might need to be implemented by a state, rather than local government. Also, the subsidy need not be paid per item. A payment per ton can provide the recycling plant with incentives to obtain more materials from households. Finally, a related set of taxes and subsidies can encourage firms to design their products to use the right amount of packaging and degree of recyclability. See D. Fullerton and W. Wu, "Policies for Green Design," NBER Working Paper No. 5594, May 1996.

additional emissions are successively less crucial to production.) The desired substitution in production from this "dirty" input to other "clean" inputs then can be achieved by a subsidy to all clean inputs. This subsidy tends to reduce the equilibrium price of output, which might encourage more purchases of this good. That effect can be avoided by a simple excise tax on the output. The result is a two-part instrument. The tax on output is equivalent to a tax on all inputs at the same rate. This tax is refunded on clean inputs, leaving an implicit tax on the dirty input. Each tax and subsidy applies only to market transactions which have invoices to verify the tax base.

The idea of a two-part instrument is perhaps most important in a case where the emissions are difficult to measure and the tax is difficult to enforce. Therefore, a third example might be emissions from the millions of motor vehicles in this country that are owned by many individuals who might tamper with on-board devices or avoid remote sensing stations designed to measure the tax that each person owes. Even without tampering, measurement might be expensive. Preliminary findings indicate that all the desired incentive effects of an emissions tax can be achieved by the combination of a tax on each fuel and a subsidy at the appropriate rate on each abatement technology including methanol, compressed natural gas, or other alternative fuel vehicles.⁷ Thus the measurement of emissions is unnecessary.

A fourth example involves the environment through common-property natural resources, such as water, that tend to be overused if not priced properly. Groundwater is hard to price explicitly, since a landowner can take as much as desired for free. Yet efficiency may require a price that covers the "scarcity rent" or any negative externality from depletion of the aquifer. The scarcity rent is the amount that others would be willing to pay for the water if they had the opportunity. An example of a negative externality is the reduction in springwater necessary for maintaining certain endangered species. If a farmer uses groundwater for irrigation along with other inputs in production, then a two-part instrument could tax the agricultural output, and subsidize all of the inputs other than water.⁸

⁷ D. Fullerton and S. West, "Two-Part Instruments for the Control of Vehicle Emissions: Derivation and Numerical Implementation," work in progress.

⁸ D. Fullerton and M. Mathis, "Achieving Optimal Use of Water," work in progress.

When Government Needs Revenue

With no revenue constraint, or the availability of lump sum taxes, the “first-best” tax on a polluting input is equal to “marginal environmental damages.” The firm is then faced with the full social cost of using that input. The two-part instrument taxes output and subsidizes other inputs, all at rates based on the same concept, marginal environmental damages.⁹

Now, suppose that revenue must be raised using distorting taxes that affect labor supply and saving decisions. Perhaps the two-part instrument could help to raise revenue by imposing a higher tax and paying a lower subsidy. This suggestion is related to the “double dividend hypothesis,” that an environmental tax can help both to fix an environmental problem and to raise revenue for use in reducing other distorting taxes.¹⁰ Some have inferred that this second-best pollution tax rate should exceed marginal environmental damages. Recent research finds the reverse, though: the pollution tax raises output prices and reduces the real net wage, so it distorts labor decisions as well as the consumption mix.¹¹

What about the two-part instrument? Whatever the desired rate of tax on the dirty input, the same change in relative prices can be achieved by a tax on output that is returned on clean inputs. Thus the subsidy must match the tax. If second-best considerations reduce the desired-but-unenforceable tax on emissions, then they reduce both parts of the two-part instrument. Revenue considerations do not suggest raising the tax and reducing the subsidy.¹²

⁹ In a first-best model, without revenue constraints, explicit closed-form solutions for the necessary tax and subsidy rates are provided in D. Fullerton and A. Wolverton, “The Case for a Two-Part Instrument . . .”

¹⁰ A review of this literature is provided by L. Goulder, “Environmental Taxation and the Double Dividend: A Reader’s Guide,” *International Tax and Public Finance* 2, 2 (August 1995), pp. 157-83.

¹¹ A. L. Bovenberg and R. A. de Mooij, “Environmental Levies and Distortionary Taxation,” *American Economic Review* 84, 4 (September 1994), pp. 1085-9.

¹² D. Fullerton, “Environmental Levies and Distortionary Taxation: Comment,” *American Economic Review* 87, 1 (March 1997), pp. 245-51.

Scarcity Rents

The point about revenue and the double-dividend hypothesis relates to my recent research with Gib Metcalf.¹³ The double dividend literature has suggested that a revenue-raising instrument, for example a pollution tax, can provide higher welfare than a non-revenue-raising instrument, such as quotas, permits, or command-and-control (CAC) restrictions on emissions. All of these policies can provide the same environmental improvement, and all raise the cost of production, but only the tax generates revenue that can be used to reduce distorting taxes on labor.

For example, the Clean Air Act Amendments of 1990 restrict emissions by using permits that are handed out to firms. The requirement to use these valuable permits raises the cost of production, and thus lowers the real net wage, but the scarcity rent goes to permit recipients. We show that the double-dividend debate should focus not on whether an environmental policy raises revenue, but on whether it creates scarcity rents that are left in private hands. Only if government sells all permits (or has a 100 percent profits tax) can it capture the scarcity rent and use that revenue to offset the reduction in the real net wage by cutting the labor tax.

Regulators can impose different kinds of CAC restrictions. If they simply restrict emissions, then they create scarcity rents that must be covered by a higher price of output. In contrast, regulators can require a reduction in emissions *per unit* of output. If it applies equally to all firms, and does not limit entry, then this policy does not create scarcity rents. For small changes, this “technology restriction” has no first-order effect on the cost of production. It does have first-order effects on the environment, however. So this *non*-revenue-raising policy unambiguously improves welfare, just like the revenue-raising emissions tax.

To clarify further that raising revenue is not the crucial distinction, one can compare an environmental tax that raises revenue to an environmental subsidy that *costs* revenue. One might think that an environmental subsidy would provide less welfare, since it must be financed by *raising* other distorting taxes. Yet the environmental subsidy has exactly the *same* effects as

¹³ D. Fullerton and G. Metcalf, “Environmental Controls, Scarcity Rents, and Pre-Existing Distortions,” forthcoming as an NBER Working Paper.

the environmental tax! The tax on a dirty input raises the cost of production. This in turn raises the price level, and would reduce the real net wage except for the fact that the revenue can be used to cut the labor tax. Symmetrically, the subsidy to a clean input reduces the cost of production. This reduces the price level, and would raise the real net wage except for the fact that the subsidy needs to be financed by *raising* the labor tax. Either way the real net wage is unaffected, so labor supply distortions are unaffected.¹⁴

Fully specified, both of these policies are revenue-neutral. The two-part instrument (environmental subsidy financed by a higher labor tax) is equivalent to the emissions tax (with revenue used to lower the labor tax). The crucial distinction is not whether the environmental policy raises revenue, but whether it restricts the quantity of emissions in a way that creates a scarcity rent that is left in private hands, rather than captured by government and used to offset the effect of higher output prices.

Implications of a Deterministic Coin Toss for Economic Modeling

Laura McCann¹

A coin toss is often presented as the quintessential stochastic event. Schoolchildren know that the probability of obtaining heads is $\frac{1}{2}$ if the coin is fair. Coin tosses are used to determine which side goes first in various sports as well as by the decisionally challenged. We thus rely on fate to determine whether the Redskins or the Vikings kick off and whether to go to Florida or California for a vacation.

But how stochastic is a coin toss? Haven't many of us wondered whether we would be more likely to end up with heads if we placed the coin heads up? Mathematician and magician Persi Diaconis has said that a coin tossing isn't random, it's physics (1997). Heads or tails is a function of the velocity and revolutions per minute. I suggest that other factors might include the side of the coin that faces up at the outset as well as the moment at which the coin is snatched out of the air. More specifically, this deterministic event can be represented by:

$$S_e = f(S_b, V, R, T)$$

where

S_e is the outcome, the side of the coin that is up at the end of the toss,

S_b is the side of the coin that is up at the beginning of the toss,

V is the velocity of the coin,

R is the revolutions per minute of the coin, and

T is the time at which the coin is retrieved.

Thus we see that the result is a function of variables that are under our control and parameters that could be known. While physicists may quibble with my choice of variables, and while I would be dismayed if anyone actually tried to determine the parameters of such a model, I think this is a useful analogy for economics.

Many areas of economics involve the study of stochastic events. In the area of resource economics, many models include the probability that a particular natural event or technological discovery will be observed. In agricultural economics, decision making

¹⁴ Ibid.

under risk and uncertainty is an important area of research since climatic variation and price variation are important determinants of farm income. In finance, a stochastic price process is used in portfolio decisions. In macroeconomics, there are optimal growth models with stochastic shocks. Alternative states of nature with associated probabilities are ubiquitous in the economics literature. A search of the Econlit database using stochastic, probability, and uncertainty (let alone their permutations) as subjects found almost 20,000 entries.

As the coin example shows, stochastic events can instead be thought of as deterministic events about which the state of knowledge is incomplete. Instead of the probability of observing price P_1 being equal to p and the probability of observing price P_2 being equal to $1-p$, it may be more correct to view it as one price with a confidence interval. This is important in that the effort should then be focused on determining what variables influence price and on reducing the confidence interval, rather than on more sophisticated ways of dealing with a stochastic price. In the same way, predicting the weather for next year, the date of a technological breakthrough, or the price of copper, may be more useful than treating those events as stochastic. I would argue that there are no events that are inherently stochastic, only events about which our knowledge is less complete than our knowledge about other events. A problem is that treating states of nature as deterministic, and learning what causes the states of nature, would require increased dependence on other disciplines and on plentiful data. For example, rainfall is often treated as a random event by economists but not so by climatologists.

By labeling certain types of events as stochastic, we also close off our minds to new developments that would make the description of a deterministic process possible. Breakthroughs in knowledge about weather patterns, the biology of ecosystems, the copper industry, or the process of technological change may be ignored once the stochastic label has been applied to a process or event. If models of farmer decision making use long run weather patterns whereas farmers in developed countries have access to the weather service's predictions for that year when making their decisions, the uncertainty will be overstated.

Perceiving deterministic events as stochastic also poses a dilemma for the assumption of perfect information. We assume that agents know the probabilities and outcomes with certainty over an infinite time horizon but that they do not know the process that generates the

probabilities and outcomes. This seems to be rather contradictory.

It may still be the case that economists should model certain events as stochastic, but I would argue that that choice should be explicit and justified. It should be justified so that effort is focused where it can be most effective. The researcher should ask whether it is more useful to help agents make decisions under uncertainty, or to reduce the uncertainty. The choice should be explicit so that as new knowledge is generated, researchers can reduce the number and types of events that must be modeled stochastically. As for me, I choose to keep on flipping coins for those tough decisions.

Reference:

1997. Diaconis, Persi, "The Search for Randomness," Guy Stanton Ford Memorial Lecture, University of Minnesota, May 7, Minneapolis, Minnesota.

BULLETIN BOARD

DATA FROM GLEN CANYON NONUSE VALUE STUDY

Interested researchers can now obtain data from the U.S. Bureau of Reclamation's Glen Canyon Environmental Studies (GCES) Nonuse Value Study from the National Technical Information Service (NTIS).

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