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Description of document: **List of periodic employee colloquia, brown bag lunch talks, and employee seminar discussions held at The Environmental Protection Agency (EPA) Headquarters 2006 - 2008**

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 27 2009

OFFICE OF
POLICY, ECONOMICS
AND INNOVATION

Re: Freedom of Information Act Request HQ-RIN-01982-08 (HQ-APP-00062-09)

This is in response to your FOIA request HQ-RIN-01982-08 (HQ-APP-00062-09). You narrowed the scope of your request to the Office of the Associate Administrator for Policy, Economics and Innovation (Louise Wise), the Director of the National Center for Environmental Economics (Albert McGartland) and the Director of the National Center for Environmental Innovation (Betsy Shaw). You requested a copy of available list(s) of periodic employee colloquia, brown bag lunch talks and employee seminar discussions held at EPA Headquarters in 2006, 2007 and 2008, limiting search time to two hours.

Enclosed are twenty-seven (27) pages of responsive documents from the National Center for Environmental Economics. There were no other prepared lists available.

Should you have any questions, please contact Nancy E. Morley, Office of Policy, Economics and Innovation FOIA Coordinator at (202) 566-0945.

Sincerely,

A handwritten signature in black ink that reads "Pamela P. Stirling".

Pamela P. Stirling
Director
Administrative Support and Innovation Staff
Office of Policy, Economics and Innovation

Enclosure

List of periodic employee colloquia, brown bag lunches, employee seminars – for 2006, 2007, 2008

2006

2006 BROWNBAG SEMINARS:

“Valuing management options and environmental changes in a recreational fishery”
Steve Newbold and Matt Massey (3/22/06)

In this paper we develop a simple bioeconomic model of a recreational fishery to investigate the effectiveness of various fishery management options. The bioeconomic model combines a recreation demand model based on random utility maximization with a model of fish population dynamics that incorporates size structure and habitat heterogeneity. The model is illustrated in a stylized application to the Atlantic coast summer flounder fishery. We use data from a stated choice survey to estimate the relative values anglers place on total catch, take home catch, size of catch, and trip costs. This information, plus aggregate data on trip demands and harvest levels, is used to calibrate the bioeconomic model to baseline conditions in the fishery. We then conduct a variety of simulation experiments to evaluate the effectiveness of catch limits, size limits, access fees, limited entry restrictions, and area closures for meeting long run economic and biological objectives. We also investigate the influence of the management regime on the value of environmental improvements that would increase fish reproduction or survival.

Our results suggest that a trip quota would be the most effective way maximize sustained recreational use value in the fishery. An access fee with a lump sum rebate also could yield substantial increases in sustained use value. Catch limits, size limits, and area closures generally lead to reductions in use values – except when the fishery is heavily exploited, in which case size limits could increase sustained use values. Also, if nonuse values or biological objectives justify a sufficiently larger stock size than that maintained under the optimal use value regime then catch or size limits may be the most cost effective option. Environmental improvements appear to be most effective when the fishery is managed using access fees.

“Coordinating Global Trade and Environmental Policy: The Role of Pre-Existing Distortions”
Liwayway Adkins and Richard Garbaccio 4/19/06

While economists generally agree that trade liberalization can be an important driver of economic growth, there is concern that increased trade will have negative impacts on the environment. One alternative is to coordinate trade liberalization with corrective environmental policies. A growing body of research, however, has shown that environmental policies may involve previously unrecognized welfare costs due to their interaction with pre-existing distortions in the economy. To date, very little work has looked at coordinated trade and environmental policy reform in light of this research. A key obstacle is that the standard database used in multi-country models – from the Global

Trade Analysis Project (GTAP) – has a very poor representation of distortions beyond those affecting international trade. In this study, we augment the GTAP database with data on taxes and other distortions and develop a global CGE model which accounts for tax interaction and revenue replacement effects. We explore a number of options for coordinated trade and environmental policy, and find that accounting for these second best effects has a significant impact on the results.

“Strategic Pricing with an Irreversible Substitute”

Ian Lange, 5/17/06

Coal-fired power plants two main methods for compliance with the 1990 Clean Air Act Amendments (CAAA) have been to burn low-sulfur coal or install a scrubber. The decision to install a scrubber is costly and once one is installed there is little reason to also purchase low-sulfur coal (which has a sulfur premium priced into it). For these reason, the decision to install a scrubber may be considered an irreversible compliance option. In the early to mid 90s, Phase I of the 1990 CAAA forced a group of previously uncontrolled plants to choose a compliance strategy. Low-sulfur coal mines, especially those in the Western Basin, have an incentive to strategically “under-price” their coal to Phase I plants at the outset of the 1990 CAAA to avoid a shift in demand for their product from the installation of scrubbers. The presentation will go through a model of strategic pricing and discuss attempts to find evidence of strategic pricing in coal data.

“Measuring the Social Benefits of EPA's Land Cleanup and Reuse Programs”

Robin Jenkins, Elizabeth Kopits, and David Simpson, 6/15/06

The EPA has a cornucopia of cleanup and reuse programs ranging from the Superfund Program which manages cleanups at sites posing imminent danger and at many of the most hazardous sites nationwide, to the Brownfields Program which provides grants to states and local governments to cleanup lower risk sites. These programs provide a common set of social benefits: reductions in health risks and ecosystem damages, and improvements in amenity values. The manifestation of these primary benefits is through changes in the productivity of factors of production, land in particular. To measure the social benefits of cleanup, a researcher might target the primary effects on health risks or the secondary effects on productivity. The former requires information on fate and transport of hazardous constituents and on human exposure pathways. Only a small number of researchers have completed work in this area, targeting either a specific hazardous constituent (VOCs) or a specific health effect (cancer) and a specific program (Superfund). Many more researchers have studied the effect of cleanup on improved productivity via hedonic property value analyses. These analyses have been inconsistent in the baseline set of conditions (discovery, listing, post-listing, record-of-decision) against which property value changes are compared. Turning to reuse, a possible social benefit of reusing a contaminated site is the preservation of "greenspace." A couple of studies have provided information on this subject including an oft-quoted estimate of the acreage of greenspace preserved per acre of reused contaminated land.

Taken as a whole, the literature providing information on the social benefits of cleanup and reuse is spotty and incomplete and perhaps raises more questions than it answers. Would a comprehensive study of the benefits of all cleanup programs, or even of all aspects of one program, do better to focus on primary effects or property value changes? What is the appropriate baseline for hedonic studies? Under what conditions is preservation of greenfields an outcome of reusing contaminated land?

“Regulation on the Intensive and Extensive Margins (‘Trade Good; Cap Bad’)”
Brian Mannix, 6/21/06

Agricultural land use predictors of arsenic in drinking water from groundwater in the Eastern and Southern Shores of Maryland.
Onyemaechi Nweke, 6/28/06

The land application of arsenic-containing broiler waste to cropland in broiler producing areas results in the environmental release of the inorganic arsenic species arsenate and arsenite into soils, and possibly groundwater. In this study, we evaluated the extent of the relation between the land application of arsenic-containing broiler waste and arsenic in drinking water from groundwater using multivariate regression techniques. Log arsenic concentration in drinking water from groundwater samples collected from the broiler producing Eastern and non-broiler producing Southern Shores of Maryland were regressed against metrics of agricultural land use most likely to result in the introduction of arsenic-containing broiler waste into soil media - percent cropland and the density of broiler farms within a 1Km radius selected as the area of well influence. Log arsenic concentration was statistically significantly positively associated with percent cropland within the area of influence, adjusting for other predictors ($\beta = 0.06$; $p < 0.005$). The association also proved to be non-linear when a quadratic term was included ($\beta = -0.00097$; $p < 0.005$). Further analysis by geographic region indicates that this association may be driven by the relation between these 2 variables in the Upper Eastern Shore region, and possibly by inadequate estimation of the metrics of agricultural land use. The density of broiler farms was not associated with log arsenic concentrations.

“How I Spent My Summer Vacation: A Meditation on Economics and Policy, or Hangin' with Mr. Floaty”
David Simpson, 8/16/06

Dr. Simpson served on an eight member international advisory panel reviewing options for liquid waste management in Victoria, British Columbia. The project involved a challenging cost-benefit exercise. Victoria is one of the few jurisdictions in North America still releasing only minimally treated sewage into marine waters. The evidence suggests, however, that this sounds worse than it is. There are no demonstrated human health effects, and marine organisms seem to thrive on, rather than be disrupted by, the nutrients to which they are exposed. Rapid currents in the Strait of Juan de Fuca quickly diffuse the waste. However, the Strait separates Vancouver Island (on which Victoria is located) from Washington State. There is a transboundary issue, and American concerns are exacerbated by the fact that several communities in Washington State were required to initiate costly secondary treatment of sewage before its release into Puget Sound

(which the Strait of Juan de Fuca connects to the Pacific Ocean). Finally, as the National Research Council argued in its study of options for liquid waste management for San Diego, Victoria might also better spend the roughly two-thirds of a billion (Canadian) dollars required to initiate secondary treatment on revamping its storm, rather than its sanitary, sewer system. The Panel concluded its work in July with a report of its findings.

“Who Benefits from Ethanol? An Examination of Recent Regulations”
Peter Nagelhout, Clay Ogg, and Keith Sargent, 10/05/2006

The Energy Policy Act of 2005 requires that steadily increasing amounts of ethanol be blended into the US gasoline supply. Ethanol also enjoys a \$0.54/gallon direct subsidy and indirect support through subsidies to farmers who grow ethanol feedstocks (primarily corn). We will review recent estimates of the economic, energy and environmental impacts ethanol production and use, as well as prospects for large-scale production of cellulosic ethanol. We will also identify profitable areas for future research.

“Urban Air Toxics and What Can Be Done About Them”
Brian Heninger, 10/12/06

In contrast to the six common ("criteria") pollutants for which EPA sets national ambient air quality standards, the 1990 Clean Air Act Amendments list 188 toxic air pollutants that EPA is required to control. Prior to 1990, EPA had minimal success reducing emissions of air toxics. Thus, when Congress revised Section 112 of the Clean Air Act in 1990, a more practical approach to reducing emissions of toxic air pollutants was mandated. The 1990 Amendments required EPA to establish air toxic emissions standards based on maximum achievable control technology (MACT standards), and included a provision that required EPA to establish more stringent air toxic standards if MACT controls did not sufficiently protect the public health against residual risks.

I will describe the EPA's air toxics program as it existed prior to 1990 and the problems which the enactment of the 1990 amendments were intended to address. This brownbag will provide an opportunity to discuss the difficulties which continue to exist with regulating air toxics under the current federal system, and suggest recommendations for improving existing federal regulation.

“Cessation Lag Modeling and Issues in Economic Benefits Analysis”
Chris Dockins, Charles Griffiths, Amy Paternostro, 11/15/06

For health-related policies, there may be substantial lags between when exposures are mitigated (and costs incurred) and when risks are reduced. Because the benefits of a policy are a function of when they occur, analysts must understand not only changes in steady-state risks, but also how those changes are distributed over time. Failure to consider cessation lag or improperly substituting estimates of latency will bias the benefits analysis.

Including cessation lag in a benefits analysis raises some novel issues for valuing risk changes. For example, willingness to pay for risk reductions is a function of income or wealth, which is generally increasing over time in real terms. There is some disagreement among economists on the correct measure of income to use in this exercise, but alternatives may require different information on cessation lag modeling.

This presentation highlights the importance of appropriately addressing cessation lag in economic analysis, describes what may be needed from cessation lag modeling under different economic approaches, and reports on some current research in this area.

NCEE Seminar Series

The NCEE Seminar Committee hosts seminars on applied research of particular interest to the agency.

June 1, 2006

Anna Alberini, University of Maryland

“Paying for Permanence: Public Preferences for Contaminated Site Cleanup”

We use conjoint choice questions to investigate people’s preferences for income and reductions in mortality risks delivered by contaminated site remediation policies. Our survey is self-administered using the computer by residents of four cities in Italy with severely contaminated sites. We estimate the Value of a Statistical Life to be about €5-6 million for an immediate risk reduction. If the risk reduction takes place 20 years from now, however, the implied VSL is about €1.26 million. We estimate the discount rate implicit in the responses to the conjoint choice questions to be about 7%, and show that people are willing to pay for permanent risk reductions, but not just any amount. Risk reductions in the nearer future are valued more highly than risk reductions in the more distant future. We also find that the VSL is “individuated,” in the sense that it depends on observable individual characteristics of the respondents, familiarity with contaminated sites, concern about the health effects of exposure to toxicants, having a family member with cancer, perceived usefulness of possible government actions, and the respondent’s beliefs about the goals of government remediation programs. Additional questions suggest that respondents discount lives, even assuming away the cost of the program, and do so at discount rates in the ballpark of those implicit in the responses to the main conjoint choice questions.

June 20, 2006

Richard D. Morgenstern and William A. Pizer, Resources for the Future

“Evaluating Voluntary Climate Programs: The Case of Climate Wise”

Over the past decade, voluntary programs have played an increasingly important role in environmental management and pollution control. Yet existing voluntary programs-several of which have a track record dating back a decade or more-have been subject to only limited empirical evaluations. Among these evaluations, most rely either on before-after studies of participants, or on gross comparisons of emission outcomes between participants and non-

participants that are likely to be biased. The decision to participate may not be random (e.g., exogenous) and, in particular, may be correlated with the outcomes.

Our paper uses plant-level data from the Census of Manufactures and Annual Survey of Manufactures to evaluate the Climate Wise program with particular attention to this selection problem. Climate Wise is a voluntary program with the non-utility industrial sector developed by the U.S. Environmental Protection Agency (EPA) to encourage the reduction of carbon dioxide (CO₂) and other greenhouse gases (GHGs) in that sector. Using energy use as a proxy for CO₂ emissions, we measure the performance of participants and non-participants before and after program inception. To address the selection problem, we use both propensity score and Heckman-style approaches to alternately correct for selection on observable and unobservable variables.

Initial results using a control group matched on propensity score suggest the absence of any programmatic effect. These results, however, do not control for possibly different growth rates (versus levels) among participants and non-participants prior to the program. We will incorporate this adjustment, the Heckman-style results (using proximity to an EPA office as the excluded variable), and other comments received during recent presentations in the final paper.

11-29-2006: Terry Dinan, CBO,
"Shaping Climate Change Policy in the Face of Uncertainty about Costs and Benefits"

Abstract: The atmospheric concentration of greenhouse gases, most notably carbon dioxide, has gradually increased and, in the view of most climate scientists, is warming the global climate. Analysts have examined the role that two policies—pricing carbon dioxide emissions and encouraging research and development of new carbon reducing technologies—might play in limiting current and future emissions. This presentation examines available research on the relative contribution that those policies are likely to make in encouraging cost-effective reductions in emissions as well as analyses on whether it would be most efficient to implement the policies simultaneously or sequentially. Finally, the presentation demonstrates why, in the face of uncertainty about the cost of limiting emissions, price instruments are likely to be more efficient than quantity instruments.

12-05-2006: Spencer Banzhaf and Eleanor McCormick, Georgia State Univ.,
"Moving Beyond Cleanup: Identifying the Crucibles of Environmental Gentrification"

Abstract: This paper reviews the distributional impacts associated with "environmental gentrification" following the cleanup and reuse of contaminated land. By making a neighborhood more attractive, land cleanup and reuse may drive up local real estate prices. Renters in the neighborhood would have to pay higher rents. Although they would also reap a capital gain, homeowners too would face higher housing costs, including perhaps higher tax bills. Moreover, existing residents may not value the removal of the disamenity as much as other households, creating a mismatch between their priorities and the new character of the neighborhood. Thus, even if they do not move, existing residents, especially renters, may be harmed by the gentrification effects of cleanup. If many former residents do move, to be replaced by wealthier households, the character of the neighborhood would change further,

feeding the gentrification. Such environmental gentrification is a key concern of local stakeholders. Nevertheless, the extent of environmental gentrification, if any, following cleanup and reuse of contaminated properties has not been solidly confirmed in the empirical literature. This paper seeks to fill that void by reviewing the evidence to date. The authors find limited evidence for rising real estate prices following land cleanup. They find stronger evidence for increased housing density and increasing incomes, but no evidence for racial impacts. Their review also uncovers a variety of factors that are likely to temper the adverse consequences of gentrification for residents.

12-12-2006: Jeffrey Zabel, Tufts Univ.

"The Impact of Imperfect Information on the Cleanup and Reuse of Contaminated Properties"

Abstract: The well documented existence of hundreds of thousands of contaminated properties is a major environmental problem in the United States. Recently, there has been a lot of discussion in the academic literature about the benefits of the redevelopment of contaminated sites in the context of major policy issues such as curtailing urban sprawl, sustainable development of urban areas, affordable housing, and open space. In the political arena, President Bush has made brownfields redevelopment one of his top environmental priorities by signing the Small Business Liability Relief and Brownfields Revitalization Act in 2002. These actions appear to indicate that many contaminated properties are under-utilized and that significant benefits may well be obtained from their remediation and redevelopment. Given that there *may be* positive net benefits, why is it that these sites have not been clean up and redeveloped? Researchers have focused on the role that liability plays in the under-development of contaminated properties. Yet, the deterrence effect of liability appears to contradict economic theory that indicates that a properly functioning property market should capitalize the costs associated with liability into the selling price and hence should not be a deterrence to developers. This should be the case as long as both the buyer and the seller have full information about the contamination level; no matter whether this is actual or potential contamination. The focus of this paper is on the role of asymmetric and incomplete information in deterring socially optimal remediation and redevelopment of contaminated sites. First, a model of contaminated property transactions is developed. Second, the concept of incomplete information is defined and applied to this model. It is then shown how incomplete information can deter socially optimal transactions of contaminated properties. Third, a framework for empirically estimating the impact of incomplete information on property transactions is developed. Fourth, a framework for measuring the associated welfare loss from the reduced rate of property transactions is established. Finally, recommendations about how to proceed in this relatively new area of research are provided, particularly with respect to estimating the empirical model.

12-18-2006: Marie Howland, Univ. of Maryland,

"Employment Effects of Brownfield Redevelopment: What do we know from the literature?"

Abstract: The purpose of this review is to survey the literature addressing the employment effects of brownfield redevelopment. Economic development has emerged as a potential goal of the environmental cleanup process. The evolving literature (1) addresses the redevelopment and job creation that has followed the numerous cases of environmental remediation; (2) continues to debate whether brownfield redevelopment creates new jobs or leads to the spatial reallocation of

existing jobs; and (3) documents emerging efforts to tie brownfield redevelopment benefits to local residents and the un- or underemployed. The existing literature highlights the difficulties of moving from site cleanup to neighborhood revitalization. The literature is clear: site cleanup alone is typically not enough to stimulate neighborhood regeneration in the most distressed neighborhoods. There are tradeoffs between financial feasibility and tackling the most contaminated sites in the most distressed neighborhoods, and the redevelopment in these neighborhoods generally required large government subsidies. The literature highlights many positive developments and experiments. Apparent successes involve large scale plans that integrate site cleanup with wider community plans, the growing tendency to link jobs on brownfield sites to local residents, increasingly sophisticated subsidies and incentives, and the importance of design that integrates redevelopment with the existing neighborhood. To steer clear of gentrification, redevelopment strategies should focus on attracting employers who will hire local workers.

2007

FY2007 NCEE BROWNBAG SEMINARS:

“Analysis of PCB body burden data from NHANES 2001-2002 “
Daniel Axelrad, Stephanie Ross and Tracey Woodruff, 1/11/07

Exposure to polychlorinated biphenyls (PCBs) has been associated with neurodevelopmental effects, developmental immunotoxicity, cancer and other effects. PCBs are persistent, bioaccumulative and widely distributed in the environment, although environmental concentrations have declined since the mid-1970s.

PCB body burdens have been measured in a representative sample of the U.S. population, age 12 years and older, as part of the National Health and Nutrition Examination Survey (NHANES), 1999-2002. The large number of congeners reported in NHANES, changes in sample analysis methods implemented in 2001, and the frequency of non-detectable levels for some of the congeners pose challenges to evaluation of the PCB data.

Objectives. To identify a metric or metrics that summarize the PCB body burden data in a representative and meaningful way, and to compare PCB body burdens by age, race/ethnicity, income and gender, with a primary focus on women of childbearing age. We are analyzing data for the PCB congeners measured in 2001-2002 with sufficient detectable values. We are evaluating the correlation of six summary exposure metrics among women of childbearing age; comparing body burdens across race/ethnicity and income categories; and comparing body burdens across birth cohorts defined by decade in which the subject was born.

“A Combined Conjoint-Travel Cost Demand Model for Measuring the Impact of Erosion and Erosion Control Programs on Beach Recreation”

Ju-Chin Huang, George R. Parsons, P. Joan Poor, Min Qiang Zhao, 1/17/07

In this paper, we examine the impact of beach erosion and erosion control on the demand for beach trips. A contingent behavior setting of a hypothetical erosion control program, which employs a conjoint design to identify a program’s potential effects (visible structure, poorer sand quality and so forth) on the beach environment in addition to preventing erosion, is incorporated into an in-person beach trip survey. Our results show that the recreation benefits of preventing erosion can be offset by the losses associated with the negative effects of erosion control. We also find that the economic values of erosion control vary across beaches that provide different activities and services. The findings may be used by policy makers to design economically efficient erosion control programs for beaches according to their specific characteristics.

“Solid Waste Management with Unit-Based Pricing: Policy Endogeneity and Price Sensitivity”
Ju-Chin Huang, 5/30/07

Many municipalities across the U.S. have turned to unit based pricing (also known as pay as you throw--PAYT) as a vehicle for reducing municipal solid waste generation,

increasing recycling, and promoting equity in paying for the service. While previous studies have documented significant reductions in solid waste generation when unit pricing is implemented, these studies have also found extremely inelastic own price demand for waste disposal that hinders the claim of policy effectiveness. In this paper, we question the standard analytical methods to examine the impact of PAYT in the literature that the econometric shortcomings may have led to underestimation of policy effects. We argue that policy choices can be endogenous to solid waste generation. Further, the sensitivity to the PAYT pricing can be dampened because of the inclusion of a large number of non-PAYT towns (whose marginal prices of solid waste disposal are zero) in the regression analysis. A two-tier analytical approach is proposed to analyze the impact of PAYT and is demonstrated in a case study of New Hampshire municipalities. We find that the presence of PAYT program, availability of curbside collection, mandatory recycling, and price to dispose of waste are all significant influences on solid waste generation. More importantly, we demonstrate that the highly inelastic own price demand for waste disposal illustrated in some previous studies may be somewhat overstated.

“Saving Salmon: Cost Effective Management of a Migratory Species”

David Simpson, Steven Newbold, and Heidi Albers, 6/27/07

Of all the controversies that have arisen in the management of endangered species, those involving Pacific Salmon are among the greatest. These fish migrate over thousands of miles of fresh- and saltwater habitat in many states and two countries. Their survival is a weakest-link-in-a-chain phenomenon. Should conservation expenditures be focused upstream to protect their spawning habitats, in the mainstems of the rivers through which they pass to the ocean, or in the ocean habitat itself by restricting fishing? Using a sequential optimization model, we derive some general rules for allocating conservation expenditures at various points along the salmon life cycle. While our main purpose now is to report work in progress and get some feedback, we offer some rough estimates as to where and when costs might most effectively be incurred in salmon management.

“The value of information for environmental policy decisions”

Steve Newbold, 7/25/07

This paper demonstrates how a decision-maker can calculate the value of information (VOI) from a new non-market valuation study for use in a benefit-cost analysis of a proposed environmental policy. The value of a new study is the difference between the expected value of the policy option if the decision is deferred until after the study is conducted and the expected value of the policy if the decision is made without new information. I begin by considering several simplified cases to build intuition and to derive rules of thumb that may be useful for screening analyses. Next, I use two previously published meta-analyses of non-market valuation studies (Carson *et al.* 1996, Murphy *et al.* 2005) to estimate a likelihood function characterizing the accuracy and precision of stated preference (SP) or revealed preference (RP) valuation methods. I then put these likelihood functions to use in three examples. The first investigates the conditions under which a decision-maker should commission a new SP study when the costs of a policy are known but the benefits are uncertain. The second considers whether

an RP or SP study should be conducted as a function of the prior expectations about the relative magnitudes of use and nonuse benefits. The third considers the relative values of a new scientific study to improve the estimate of policy impacts (e.g., reduced mortality) versus a new economic study to improve the estimate of the value of those impacts (e.g., the “value of a statistical life”).

“Pollution Permits Prices & the Information Puzzle (Or Why Do Smart People Seem to Make Dumb Decisions?)”

Ian Lange, 8/1/07

All three major tradable permit programs (US Acid Rain, US NO_x Budget Program, and EU Emissions Trading Scheme (Carbon Dioxide)) have had high predicted and initial market prices that subsequently crash. In all three cases, ex ante predictions were based on the installation of large scale, high removal, post-combustion technology. In reality, the regulated firms used marginal changes to their fuels/given technology to a larger extent than expected to reduce emissions, which are used to explain the actual price path. However, the firms making these marginal changes presumably would know the effect of their actions and could potentially extrapolate the effect of these decisions on a large scale. A firm with this information would want to sell permits while the price is high; instead it seems that firms wait for the price to crash. A number of potential explanations for this behavior are explored including risk aversion, loss aversion, precautionary banking, and bounded rationality.

“Feasibility of Using Emissions Reductions as the Only Strategy for Avoiding Dangerous Global Climate Changes”

Alan Carlin, 8/21/07

Proponents of greenhouse gas emissions reductions have long assumed that such reductions are the best and least risky approach to global climate change control. This paper examines whether it is feasible to use this approach alone to control dangerous global climate changes, the most critical of the climate change control objectives. I show that in one of two critical cases analyzed such an approach is not a feasible single approach to avoiding the dangerous climate changes predicted by a very prominent group of US climate change researchers. In the other case using an accepted international standard I show that such an approach appears to be very risky and much more expensive than previously thought. These conclusions further reinforce previous research that emissions reductions alone do not appear to be an effective and efficient single strategy for climate change control. So although emissions reductions can play a useful role in climate change control, other approaches appear to be needed if dangerous climate changes are to be avoided. This conclusion suggests that the current proposals in a number of Western European countries and the United States to use emissions reductions as the sole means to control global warming may be doomed to failure in terms of avoiding such dangerous changes. An alternative approach is briefly discussed that would be more effective and efficient, and could avoid the perilous risks and high costs inherent in an emissions reduction only approach.

“Cost Effective Approaches to Achieve Both Climate Change Mitigation and Energy Security”
Clay Ogg, October 10, 2007.

The discussion will begin to rank options for achieving climate change mitigation and energy security in order to identify options that are most cost effective in advancing both objectives. By identifying much more detailed cost curves containing these options, research could help achieve consistency across government regarding acceptable costs for achieving the dual objectives. In the past, some of the most important environmental effects of options, such as the land use changes associated with biofuel options, have not been adequately quantified. California policies employ the above approach of focusing on the cost effective remedies with considerable success. Europe and the U.S. pursue some very effective remedies, but also some that are not effective. Research with the above focus on developing reliable cost curves could support more consistent and effective approaches.

“Work Loss Associated with Annual Air Pollution Exposure” [Special National Center for Health Statistics Brownbag] Jennifer Parker, Ph.D., Health Research Scientist, National Center for Health Statistics and Derek Johnson, M.A., APTR Fellow, National Center for Health Statistics October 16, 2007.

Past studies have shown an association between chronic exposure to air pollution and the number of missed work days. NCHS is conducting a study to examine the association between employee work loss days and exposure to annual average air pollution for selected criteria pollutants, including exposure to fine particles (PM_{2.5}), ozone, and sulfur dioxide. Elements of the study will include:

- Identifying a comprehensive list of work loss predictors;
- Comparing the associations between these work loss predictors and pollution level;
- Examining the association between selected air pollutants and work loss in the presence of potentially confounding factors; and
- Examining the role of differential linkage to each pollutant on findings.

The data that will be used in this study are 1999-2005 National Health Interview Survey (NHIS) and the EPA's Air Quality System (AQS) database. The NHIS is a nationally representative survey conducted by the National Center for Health Statistics (NCHS). Each year approximately 40,000 households and 100,000 respondents are included in the NHIS. The AQS is EPA's repository of ambient air quality data. Among other metrics, the AQS includes annual average pollution levels and monitor location for monitors throughout the United States.

“What Would Chou En-lai Have Said About the Columbian Exchange?” David Simpson,
October 18, 2007.

When is an ounce of prevention worth a pound of cure? Some have argued for placing restrictions on international trade and travel to prevent further biological invasions rather than trying to control exotic plants and animals after they have gained a foothold. If those who

accidentally or intentionally introduce exotic species into new environments do not internalize the costs of their actions, they will import too many species. Like other polluters, they should be made to pay for the damage they cause.

I find this view problematic for several reasons:

1. It is not clear that the consequences of transplantations are generally negative.
2. Even if one stipulates that consequences are asymmetrically negative, there is little hope of estimating costs well enough to inform policy.
3. The trade policy cure may be worse than the invasive disease.
4. The *biological* consequences of trade restrictions might prove surprising.
5. Biological invasions may turn conventional wisdom on its head; the ostensibly more "conservative" strategy may favor short-, as opposed to long-term interests.
6. Dealing with invasive species, like dealing with climate change and other complex issues, involves reconciling widely divergent world views. I have serious doubts that our economic tools can get much traction on these issues.

Public policy toward invasives like public policy toward climate should probably be driven by worst-case scenarios. What's the worst that could happen to us? There's an interesting historical precedent: the European colonization of the New World was the greatest biological catastrophe in history. This begs a couple of questions. First, has the world changed enough between then and now to make the Columbian Exchange irrelevant? I'll argue that it may not have, and suggest we may face analogous choices. Consider, then, what one might have done if appointed Court Economist to Ferdinand and Isabella. The implications of that thought experiment may be surprising. Would a prescient Court Economist have 1) screeched "Don't let him sail!"; 2) determined that after five hundred years, as Chou En-lai famously remarked of the significance of the French Revolution, it would still be too early to tell; or 3) reluctantly said "Unless you want to follow the path of your Chinese contemporaries, let him go"?

“An assessment of cumulative exposure to lead and mercury in subsets of the US population”
Onyemaechi Nweke, October 24, 2007.

The metals lead and mercury are known to independently exert neurotoxic effects in children following pre- and postnatal exposures. Exposures to lead or mercury in US populations have been largely characterized for each individual metal, and have also been shown to be disproportionately distributed across race/ethnicity and socioeconomic groups. However, not much is known about concurrent or cumulative exposure to both metals in the US population. Generally, emerging research suggests that differences in exposure to multiple pollutants exist in the US population, and these differences may depend on socioeconomic and race/ethnicity. In this study, we assessed the distribution of combined body burdens of lead and total mercury (as a measure of exposure) in the US population using data from the 2001-2002 and 2003-2004 NHANES surveys. This analysis focused on children aged 1-5 because the association between exposure and neurotoxicity is strongest for this age group and also for data availability reasons, and women of child-bearing age (16-49) because of pre-natal exposures. For both study populations, we identified NHANES participants at or exceeding the 75th or 90th percentiles for both metals in blood. These individuals were subsequently characterized by race/ethnicity and

income using descriptive data analysis methods. This analysis is intended to serve as a case study on potential approaches for estimating cumulative body burdens. Future analysis will include cadmium, the third metal for which NHANES data is available.

“Valuing forest fallow resources in shifting cultivation: evidence from the Eastern Amazon”
Heather Klemick, November 6, 2007.

With tropical deforestation a major contributor to greenhouse gas emissions and biodiversity loss, the land use decisions of small-scale farmers at the forest margins have important implications for the global environment. In some tropical forests, such as the Eastern Amazon, farmers practice a shifting cultivation system that maintains large amounts of land under forest fallow. I examine whether local benefits of fallowing such as soil restoration, erosion mitigation and hydrological regulation are of sufficient value to farmers to stem the expansion of cropland at the expense of forest.

I estimate the value of fallow ecosystem services and test whether local forest externalities are economically significant, using a production function approach and farm survey and GIS data from the Eastern Amazon. I find that on-farm and upstream fallow are both associated with higher farm income, indicating that fallow boosts yields on site and provides positive hydrological externalities to downstream farms.

I also investigate whether liquidity market failures encourage fallowing. If farmers cannot purchase inputs used in cultivation due to liquidity constraints, they may devote more land to fallow. I use the estimated production function parameters to determine whether each farm’s allocation of land between cropping and fallow is efficient from an individual perspective. I then estimate the effect of liquidity indicators on land use efficiency. I find that over-fallowing is negatively associated with commercial credit use and off-farm income, suggesting that liquidity constraints do hinder agricultural intensification. Because I find evidence that there are positive externalities to fallow, the loosening of liquidity constraints has ambiguous implications for community-level welfare.

2007 NCEE Seminar Series

01-24-2007: Scott Farrow, UMBC,
"Residual Risk Accounting to Inform Policy Analysis"

Abstract: News media, governments, and academics often report quantitative estimates related to various risks such as crime, incomplete education, natural disasters, accidents, health outcomes, and the like. There is currently no accounting system or scorecard that assesses these social risks in a comparable way. This paper is part of a larger project that seeks to identify, develop, and pilot methods to quantify and value policy salient residual risk outcomes in a comparable way. The resulting data are a reporting of what has occurred and are intended to inform further studies and policy decisions. Consequently the results are not an analysis of the quantity, value, desirability, or cost of risk reductions from any one program. One way to view the project is as a cross-cutting supplement to the National Income and Product Accounts (NIPA). Methodological

issues and preliminary estimates related to the determination of residual risk quantities, market and non-market values, and total values are discussed for several initial topic areas including education, crime and health.

05-10-2007: Kirk Hamilton, World Bank,
"Where is the Wealth of Nations?"

Abstract: Where is the Wealth of Nations? Not where you might think. A recent World Bank publication measures total wealth and its composition for over 100 countries. The results shed new light on the role of natural resources in low income countries. While the composition of wealth provides key information on the underpinnings of current wellbeing, the change in wealth per capita indicates whether wellbeing can be sustained – when resource depletion and population growth are taken into account, most low income countries are experiencing declines in wealth per capita. These results have important implications for development policy.

06-14-2007: Deborah Vaughn Aiken and William Zamula, CPSC,
"Valuation of Quality of Life Losses Associated with Nonfatal Injury: Insights from Jury Verdict Data"

Abstract: Evaluations of the societal burden associated with injury typically employ a cost of illness (COI) framework, focusing on direct costs, such as medical costs, and indirect costs, such as reduced productivity. However, nonfatal injuries that have long-lasting or permanent consequences can significantly reduce the quality of life for those affected. While COI evaluations are useful in demonstrating the economic burden attributable to injury, they typically do not cover quality of life losses. This study estimates the value of quality-of-life losses associated with consumer product injuries. The authors use *ex post* data based on jury awards in product liability lawsuits involving nonfatal product-related injuries. By combining data on monetary compensation awarded in these cases with estimates of the reduction in quality adjusted life years (QALYs) due to the injury suffered, they are able to estimate the component awarded for the loss in wellbeing. Their findings suggest that these awards are rationale and systematic, and that the most significant determinant appears to be injury severity, measured as the QALY loss. The values for life and quality of life losses implied by jury awards appear reasonable (if not somewhat low) when compared to the value of a statistical life literature VSL literature.

09-20-2007: Brian Scott, Washington College,
"Nitrogen Farming in the Mississippi Watershed: An Environmental Economics Policy Comparison"

Abstract: Due to the high levels of nitrogen in the Illinois water way system there exists a need for nitrogen removal as close to the emitting source as possible. This removal of harmful nitrogen can be done using two competing methods, the traditional brick and mortar chemical method, or the new, innovative managed wetland removal method. A market built around the managed wetland removal method, targeting point source emitters to purchase offsetting permits from managed wetland farms could prove more cost-effective than traditional methods. Three different market mechanisms are suggested in this paper. First is an "unrestricted" market where

emitters can buy permits from any wetland at no additional cost, a “backyard” market which requires emitters to exhaust permit supply in their own home wetland area before purchasing permits from other wetland areas, and a “penalties” market where emitters that purchase permits from downstream wetland areas must purchase extra permits as a penalty. The unrestricted model exhibited the lowest costs, but allowed for movements of the pollutant downstream before removal which increased the potential for damages done by the pollutant. The backyard market was 5% higher in aggregate abatement costs compared to the unrestricted model, but exhibited gains in keeping nitrogen removal closer to the source. The penalties model also reduced the travel distance of nitrogen effluent, but at a 25 to 30 percent increase in aggregate abatement cost over the other two models. The penalties policy would require detailed data regarding its benefits in terms of the reduction in damages in order to justify its much higher costs. Both the backyard and penalty model performed reasonably well at reducing the distance between point of emission and point of removal, however, the backyard model performed best in that it kept nitrogen removal close to the source, but at a modestly higher aggregate abatement cost than the unrestricted model.

10/3/2007 Arik Levinson (Georgetown University)

“Technology, International Trade, and Pollution from U.S. Manufacturing”

Abstract: Total pollution emitted by U.S. manufacturers declined over the past 30 years, even though manufacturing output increased. This improvement must result from one of two trends: (1) changes in production or abatement processes (“technology”); or (2) changes in the mix of goods manufactured in the United States, which itself may result from increased net imports of pollution-intensive goods (“international trade”). In this paper, I first show that most of the decline in pollution from U.S. manufacturing has been the result of changing technology instead of changes in the mix of goods produced, although the pace of that technology change has slowed over time. Second, I present evidence that increases in net imports of pollution-intensive goods are too small to explain more than about half of the pollution reductions from the changing mix of goods produced in the United States. Together, these two findings demonstrate that shifting polluting industries overseas has played at most a minor role in the cleanup of the U.S. manufacturing sector.

10/23/07 Allan R. Hoffman (U.S. Department of Energy)

“The Role of Renewable Energy in Meeting Future Energy Demand”

Abstract: Projections by the International Energy Agency, the European Commission, the World Energy Council, the U.S. Energy Information Administration, and others all point to the same general conclusions: there will be increased consumption of all primary energy sources over the next two decades; fossil fuels will remain dominant, accounting for most of the increase in energy use; natural gas demand will grow fastest but oil will still be the largest individual fuel source; nuclear power will grow, but slowly; global emissions of carbon dioxide will grow more rapidly than primary energy supply; and use of renewable energy will grow rapidly but will not displace fossil fuels as the principal energy source. These projections mask three central issues: When will world oil production peak, with attendant impacts on oil price and competition for resources? How urgent is it to reduce global emissions of carbon dioxide? How vulnerable to disruption is our energy infrastructure on which we depend so heavily? The answers to these

questions all have major implications for renewable energy in the 21st century. This presentation will address briefly the status of renewable energy technologies and the potential role they can play in addressing future energy needs and the vulnerabilities associated with our current energy system. The inevitability of a global transition to an energy system that, with time, will rely less and less on traditional fossil fuels and more and more on renewable energy sources will also be discussed.

11/1/2007 Scott McDonald (University of Sheffield), Sherman Robinson (University of Sussex) and Karen Thierfelder (U.S. Naval Academy)
"Impact of Switching Production to Bioenergy Crops: The Switchgrass Example"

Abstract: This paper reports the results from simulations that evaluate the general equilibrium effects of substituting switchgrass, a biomass, for crude oil in USA petroleum production. The new production process is less efficient and USA GDP declines slightly. As switchgrass production expands, USA agriculture contracts and the world price of cereals increases. The world price of crude oil falls as USA import demand declines. The net effect of the price and income changes is a general decline in economic welfare. Moreover, the declines in welfare are proportionately greater for developing countries that produce small quantities of agricultural commodities whose prices increase.

11/8/2007 Douglas Noonan (Georgia Institute of Technology)
"Air Quality and Forecasts: The Effects of Ozone Alerts on Driving and Outdoor Recreation Behavior in Atlanta"

Abstract: The purpose of forecasts is often to inform and affect behavior. For instance, metropolitan smog alerts serve as a key element in a public information campaign designed to curb driving and other emission-causing behavior. Despite a large literature on the behavioral effects of public information, relatively little empirical evidence exists on the effects of public forecasts of environmental conditions, especially when the behavior being changed also influences the forecasted phenomenon. In a sense, very little is known about what else shapes public policy in the burgeoning information-based environmental policy realm. This paper provides a focused discussion of these issues and contributes empirical evidence on the effects of air quality forecasts in Atlanta. The impacts of daily air quality forecasts on driving behavior are assessed by combining several datasets (including household travel diary, park usage, weather, and forecast data) and using the discontinuous or threshold nature of the smog alert system to identify forecast effects. The regression results are compared to previous estimates in Atlanta and other cities. The results indicate a nonnegative impact of smog alerts on driving behavior, despite the claims of the state's air quality plan. The hourly usage patterns in a major metropolitan park, Piedmont Park, over the summer of 2005 is also tested for sensitivity to weather and air quality levels and forecasts. Whether different types of park uses and users are more prevalent during different environmental conditions is assessed. Overall, the results suggest that weather and timing explain usage variation, with air quality information generally uncorrelated with outdoor recreation behavior. These findings highlight the complications and limits of using forecasts as part of a public information campaign in certain contexts. Perverse outcomes on high pollution

days (e.g., increased driving, increased outdoor exercise) might be occurring in Atlanta because of the particular ways that residents use air quality information. The conclusion discusses the implications for the role of forecasts in affecting behavior across different policy contexts.

2008

FY2008 NCEE BROWNBAG SEMINARS:

“Evaluating Market-Making Voluntary Programs: The Case of Coal Combustion Products Partnership” Ian Lange, February 5, 2008

The traditional view of voluntary programs in the economics literature has been that they are a substitute for mandatory regulation. In this framework, a voluntary program is said to be worthwhile if there is a differences in behavior of those that joined the program from those that did not (correcting for the potential endogeneity of choosing to enter the program). A recent paper by Lyon and Maxwell (Public Voluntary Programs Reconsidered) argues that voluntary programs whose main function is to spread information should be evaluated differently. Due to the public good nature of information, one would not expect to see any difference between those that joined the program and those that did not, adjusting for the fact that information may not travel instantaneously. I will argue that the Coal Combustion Products Partnership is a voluntary program whose main function is to spread information on (and make a market for) the reuse of coal combustion products. This program is evaluated using the methods discussed in Lyon and Maxwell. Results of the evaluation and a discussion of how the Office of Solid Waste could use these methods for other voluntary programs will be presented.

“The Greenhouse Effect: The Science Behind The Rumors” Donn Viviani, April 9, 2008.

This lecture is a step by step, empirical/rational inductive epistemologic explanation of why carbon dioxide makes us hot

“The Economics and Decision Sciences Program” Will Wheeler, May 27, 2008.

Now that the transfer of the Economics and Decision Sciences program to NCEE is official, we need to decide on a topic for the next RFA. Al has asked me to use a couple of methods to generate ideas for topics, including and NCEE brownbag. Although we should be guided in general by the Environmental Economics Research Strategy, that still leaves us with plenty of flexibility. The RFA topic could be something we have looked at before or a relatively new topic. I am attaching an excerpt from the NCER BOSC (ORD's equivalent to the SAB) discussing the application of value-of-information theory to choosing research priorities. I think it is one, useful, way to think about research needs but it's certainly not the only way.

“A New Approach towards Determining the Economic Benefits of Reducing GHG Emissions” Alan Carlin, June 11, 2008.

Abstract: The purpose is to consider if we can reasonably value the economic benefits of reducing GHG emissions with current knowledge and to suggest how these benefits might be determined. The presentation will analyze some of the major scientific uncertainties involved and show how they might be taken into account in determining benefits. The presentation represents a substantial departure from previous analyses and takes into account the viewpoints

offered by both the Intergovernmental Panel on Climate Change and the principal criticisms offered by climate "skeptics" as well as the very latest developments in the scientific controversy.

“Spillover effects of environmental voluntary actions: A case of green supply chain management” Toshi Arimura of George Mason University, Sophia University and RFF (special guest Brownbag), June 24, 2008.

This study empirically investigates the spillover effects of corporate voluntary environmental actions. Though local and national governments in developed economies have promoted voluntary environmental actions such as the adoption of environmental management systems, the literature has found mixed results on the effectiveness of these voluntary actions. Moreover, previous studies have paid little attention to the positive spillover effects of voluntary actions. However, private firms are known to request their suppliers to undertake specific proactive environmental efforts. From this viewpoint, an assessment the effectiveness of voluntary actions should include supply chain influences. We examine these issues by drawing on survey data of Japanese manufacturing facilities and assessing the spillover effects of environmental management systems.

“A Review and Meta-Analysis of Lung Cancer Utilities” Julie Migrin, July 31, 2008.

Background: Measures of health-related quality of life, such as the quality adjusted life year (QALY), are valuable for decision-making processes in a wide variety of health-related disciplines. The quality portion of the QALY is determined by a utility value, ranging from 0 to 1, which serves as an indicator of global, health-related quality of life. There are numerous published utility estimates for lung cancer, which span a very broad range, even for the same level of severity. The reason for this wide range is not completely clear, but this variability may be the result of the methods used to elicit each utility. Depending on which utility is selected for a cost effectiveness or other secondary analysis, the results can be drastically different.

Methods: A meta-regression was performed to obtain pooled health utility estimates for lung cancer and to assess which methodological factors significantly influence the value of utility. A systematic review identified twenty three articles containing 223 unique utility values which were included in the analysis. A hierarchical linear model (HLM) was used to perform the meta-regression with cancer stage, lower bound of scale, upper bound of scale, respondent, elicitation method, and lung cancer subtype as the explanatory variables.

“A Bayesian Application of Bioeconomic Policy Analysis” Chris Moore, September 10, 2008

More often than not the typical static cost-benefit analysis of environmental policy requires an over simplification of the affected ecosystem. Flows of ecosystem services are usually assumed to be constant over time or otherwise exogenously determined. To accurately estimate net benefits from environmental policy it may be necessary to specify a bioeconomic model of policy outcomes. Massey, Newbold, and Gentner (2006) and Smith (2007) are laudable examples of bioeconomic policy analysis. This study adds to this emerging body of literature by taking a Bayesian approach to estimating the net benefit function and generating a predictive distribution of net present value from policy implementation. The policy being examined is a plan to mitigate damages to national parks and forests from a destructive invasive insect. The

policy calls for a mixed chemical and biological control strategy in a network of conservation sites on federal land. The intertemporal properties of the two control media and their interaction make for an interesting dynamic model and lead to results that would be difficult to anticipate outside the bioeconomic framework. Simulation results lead to questions about the costeffectiveness of the proposed strategy in stark contrast with the results of a static analysis that generates large positive net benefits from policy.

Heather Klemick, November 3, 2008

“International Financing for Biodiversity Conservation: Innovative Approaches and Persistent Challenges”

We are writing a paper commissioned by the OECD on scaling up innovative mechanisms for biodiversity conservation using international financing. In recent decades, many programs to finance biodiversity conservation have fallen short of their goals, and casual observation confirms that a tremendous gap remains between aspirations and achievements. In light of this shortcoming, new initiatives such as direct payments for ecosystem services (PES) represent a promising development. In this paper, we review some proposals for international PES (IPES) and, more generally, for international financing mechanisms to support biodiversity conservation. Our paper describes the nature of the conservation problem and some of the mechanisms that have been proposed for addressing it. We then review some innovative approaches and important concepts for evaluating conservation approaches. We also tackle three case studies. The first is an example of IPES that has been in existence for quite some while. "Bioprospecting"—the search among natural organisms for products of potential industrial, agricultural, or pharmaceutical value—has been touted for two decades as a means of engaging the private sector in the conservation of biodiversity. To date, it has had little effect on conservation.

NCEE Seminar Series

In the interest of bringing new and creative research findings to agency personnel, NCEE sponsors several types of events to share information about environmental economics and science. There were two different series operating in 2008. The series are organized around central themes: (1) Economics, which looks at a wide array of economic issues not specific to climate topics; (2) Climate Economics topics; and (3) a new series on Climate Science topics. Brief descriptions of each follow. Additional information that includes information contained in handouts and slides used in the presentation, as well as for some additional video/transcripts of presentations, can be found at the NCEE website:

<http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Events.html>

Economics Series

3/20/08 Shanjun Li (Department of Economics, The State University of New York - Stony Brook)

“Gasoline Prices, Government Support, and the Demand for Hybrid Vehicles in the U.S.”

Exploiting a rich data set of new vehicle registrations in 22 U.S. Metropolitan Statistical Areas from 1999 to 2006, we analyze the determinants in the demand for hybrid vehicles and examine government programs that aim to promote the adoption of hybrid vehicles. We find that both the recent run-up in gasoline prices from 1999 and federal income tax incentives are important in the diffusion of hybrid vehicles, explaining about 14% and 27% hybrid vehicle sales in 2006, respectively. We compare the current income tax credit program with a flat rebate program and find that the rebate program needs less government revenue to achieve the same level of average fuel-efficiency of new vehicles. The cost advantage of such a rebate program is bigger with larger incentives.

10/23/08 Mushfiq Mobarak, Yale University, School of Management

"Decentralization and Water Pollution Spillovers: Evidence from the Re-drawing of County Boundaries in Brazil"

We examine the effect of political decentralization on pollution spillovers across jurisdictional boundaries. Upstream water use has spillover effects on downstream jurisdictions, and greater decentralization (i.e. a larger number of political jurisdictions managing the same river) may exacerbate these spillovers, as upstream communities have fewer incentives to restrain their members from polluting the river at the border. We use GIS to combine a panel dataset of 9,000 water quality measures collected at 321 monitoring stations across Brazil with maps of the evolving boundaries of the 5500 Brazilian counties to study (a) whether water quality degrades across jurisdictional boundaries due to increases in pollution close a river's exit point out of a jurisdiction, and (b) what the net effect of a decentralization initiative on water quality is, once the opposing impacts of inter-jurisdictional pollution spillovers and increased local government budgets for cleaning up the water are taken into account. We take advantage of the fact that Brazil changes county boundaries at every election cycle, so that the same river segment may cross different numbers of counties in different years. We find evidence of strategic enforcement of water pollution regulations; there is a significant increase in pollution close to the river's exit point from the upstream county, and conversely a significant decrease in pollution when the measure is taken farther downstream from the point of entrance. Pollution increases by 2.3% for every kilometer closer a river gets to the exiting border, but in the stretch within 5 kilometers of the border this increase jumps to 18.6% per kilometer. Thus the greatest polluting activity appears to be very close to the exiting border. Our theoretical model coupled with the empirical results are strongly suggestive that these results are evidence of strategic spillovers rather than spurious correlation between county splits and pollution stemming from changing population density. Even in the presence of such negative externalities, the net effect of decentralization on water quality is essentially zero, since some other beneficial by-products of decentralization (in particular, increased local government budgets) offsets the negative pollution spillover effects.

11/20/08 John Whitehead (Appalachian State University)

"Convergent Validity of Revealed and Stated Recreation Behavior with Quality Change: A Comparison of Multiple and Single Site Demands"

(co-authors: Daniel Phaneuf, Christopher F. Dumas, Jim Herstine, Jeffrey Hill and Bob Buerger)
We consider the convergent validity of several demand models using beach recreation data. Two models employ multiple site data, the linked site-selection and trip frequency demand model and

the Kuhn-Tucker demand system model. We exploit the effect of the existing variation in beach width on trip choices to analyze a 100 foot increase in beach width. We compare these models to a single site model where we jointly estimate revealed and stated preference data focusing on a hypothetical scenario that directly considers a 100 foot increase in beach width. In each case we develop estimates of the increased number of beach trips with an increase in beach width and the value of beach width. The trip estimates from each of the three models are similar and convergent valid. The convergent validity statistical test on willingness to pay suggests that the estimates converge between these models. However, the difference in magnitude is large.

Climate Economics and Science Series

1/12/2008 William Pizer (Resources for the Future)
“Intergenerational Discounting”

Abstract: We demonstrate that when the future path of the discount rate is uncertain and highly correlated, the distant future should be discounted at significantly lower rates than suggested by the current rate. We then use two centuries of US interest rate data to quantify this effect. Using both random walk and mean-reverting models, we compute the “certainty-equivalent rate” that summarizes the effect of uncertainty and measures the appropriate forward rate of discount in the future. Under the random walk model we find that the certainty-equivalent rate falls continuously from 4% to 2% after 100 years, 1% after 200 years, and 0.5% after 300 years. At horizons of 400 years, the discounted value increases by a factor of over 40,000 relative to conventional discounting. Applied to climate change mitigation, we find that incorporating discount rate uncertainty almost doubles the expected present value of mitigation benefits.

2/12/2008 Wolfram Schlenker (Columbia University)
“Estimating the Effect of Climate Change on Crop Yields and Farmland Values: The Importance of Extreme Temperatures”

Abstract: Prof. Schlenker summarized a paper written with Anthony Fisher, Michael Hanemann, and Michael Roberts. The paper pairs a panel of yearly crop yields in the United States with a fine-scale weather data set that incorporates the whole distribution of temperatures between the minimum and maximum within each day and across all days in the growing season. Yields increase in temperature until about 29°C for corn, 30°C for soybeans, and 32°C for cotton, but temperatures above these thresholds become very harmful. The slope of the decline above the optimum is significantly steeper than the incline below it. This has strong implications for global warming which is predicted to increase the frequency of temperatures above the critical threshold that are harmful for yields. Area-weighted average yields given current growing regions are predicted to decrease by 31-43% under the slowest warming scenario and 67-79% under the most rapid warming scenario by the end of the century. There is limited potential for adaptation within a crop species as the same nonlinear and asymmetric relationship is found if we look only at the time series or cross-section, and the latter should pick up how farmers adapt to warmer climates.

A cross-sectional analysis of farmland values that accounts for an even wider set of adaptation possibilities gives comparable, robust impacts. Mean impacts range from a 27 decrease under the slow warming scenario to a 69 decrease under the fast warming scenario by the end of the century. The increased frequency of very hot temperatures is again responsible for the largest share of the predicted impacts.

3/5/2008 Mark Delucchi (Institute of Transportation Studies, U.C. Davis)
“Incorporating Price Effects into Lifecycle Analysis”

Abstract: Presentation argued that no existing models of lifecycle carbon dioxide-equivalent greenhouse-gas (LC-CO₂E-GHG) emissions from transportation fuels account for the interaction of policy, the production of new fuels, *prices*, production and consumption, and finally GHG emissions. In the real world, the production of biomass and biofuels and the substitution of biofuels for petroleum will affect the prices of a wide range of commodities, from gasoline and coal to fertilizer and steel. A change in the price of a commodity will affect the production and consumption of that commodity, of course, but also will affect the price and hence production and consumption of substitutes for and complements of the commodity, products derived from the commodity, and inputs used to make the commodity. So, for example, an increase in use of biofuels in the U. S. can lead to an increase in the use of home heating oil, via the effect of biofuel substitution for gasoline on oil prices. The increase in heating oil will be partly a substitution of oil for other sources of heat, and partly a net increase in heating. Both of these affect GHG emissions and climate change. A general equilibrium model of the world economy, including government sectors, is needed to trace out all of the relevant economic effects of a particular biofuel policy or assumed market outcome. There are at least four different ways to combine life-cycle analysis (LCA) and general-equilibrium analysis: build a combined model from scratch; connect an existing LCA and an existing general equilibrium model in a meta-modeling framework; add technological detail, input-output linkages, and emission factors to an equilibrium model; or add price-production-GHG relationships to an LCA model. The focus of this talk will mainly be on the last alternative.

4/15/2008 Gerard Roe (University of Washington)
“The Shape of Things to Come: Why is Climate Sensitivity So Unpredictable (and Who Cares Anyway)?”

Abstract: Underlying all the benefit estimates of global climate change control are the climate's sensitivity to GHG increases; this presentation explored what is currently known about this critical factor. What kind of information from the climate science community is the most useful for policy makers, and which uncertainties matter most? Constraining climate sensitivity - the long-term increase in global mean temperature expected from the doubling of atmospheric carbon dioxide - has been one of the main benchmark goals of climate science. I will review the various disagreements over what future progress might be anticipated, as well as the debate about the extent to which reducing climate sensitivity even matters for any practical decisions on climate policy. Uncertainties in projections of future climate change have not lessened substantially in past decades. Both models and observations yield broad probability distributions

for climate sensitivity, with small but finite probabilities of very large increases. We show that the shape of these probability distributions is an inevitable and general consequence of the nature of the climate system. Further, we show that the breadth of the distribution and, in particular, the probability of large temperature increases is relatively insensitive to decreases in uncertainties associated with the underlying climate processes.

6/17/2008 David C. Popp (Syracuse University)

“Where Does Energy R&D Come From? A First Look at Crowding Out from Environmentally-Friendly R&D”

Abstract: Recent efforts to endogenize technological change in climate policy models demonstrate the importance of accounting for the opportunity cost of climate R&D investments. Because the social returns to R&D investments are typically higher than the social returns to other types of investment, any new climate mitigation R&D that comes at the expense of other R&D investment may dampen the overall gains from induced technological change. Unfortunately, there has been little empirical work to guide modelers as to the potential magnitude of such crowding out effects. This presentation is a first attempt to address this question. In it, the authors consider the private opportunity costs of climate R&D, asking whether an increase in climate R&D represents new R&D spending, or whether some (or all) of the additional climate R&D comes at the expense of other R&D.

7/10/ 2008 Mun S. Ho, Richard Morgenstern, Jhih-Shyang Shih (Resources for the Future)
“The Impact of Carbon Price Policies on U.S. Industry Output and Employment”

Abstract: While there are many different proposals to control carbon emissions in the U.S. they all have very different impacts on the various industries. Furthermore, the effect on industry output and employment may change over time as the economy adjusts to the carbon policy. Firms may substitute capital for energy, and consumers may substitute towards less carbon-intensive goods or imports. The length of time for these substitutions to take place varies and the long run impact may well be very different from the short run. This paper aims to inform the Congressional debates about the impact of carbon policies at the detailed industry level. Some policy proposals include an off-setting tax on imports, and we consider its impact. There are also proposals to compensate industries with free allowances under a cap-and-trade system and we estimate the level of such compensation for each industry.

9/23/2008 Dallas Burtraw (Resources for the Future)

“Cap-and-Trade Allowance Allocation Issues”

Abstract: Policies to cap emissions of carbon dioxide (CO₂) in the U.S. economy could pose significant costs on the electricity sector, which contributes roughly 40 percent of total CO₂ emissions in the U.S. The electricity sector is especially important because it is where the lion’s share of emission reductions is expected to occur in the early decades of a program. These costs fall unevenly on firms and households. Using a detailed simulation model we evaluate alternative

ways that emission allowances can be allocated. Most previous programs have allocated the major portion of allowances for free to incumbent emitters. In the electricity sector this approach would lead to changes in electricity price that vary by region primarily based on whether prices are market-based or determined by cost-of-service regulation. Moreover, the value of the allocation far exceeds the change in market value for the affected firms. Allocation to customers, which could be achieved by allocation to local distribution companies (retail utilities) would recover symmetry in the effect of free allocation and lead to significantly lower overall electricity prices. Unfortunately, this form of compensation provides an implicit subsidy to electricity consumption, which will increase the overall cost of climate policy. The presenter demonstrates the impacts at the household level across regions and income groups under these approaches, and compares these with several other approaches to allocation with the goal of cost-effective compensation for parties most severely affected by climate policy.

10/16/08 Carl Wunsch (MIT)
"Global Sea Level Rise"

Like many aspects of climate change, the problem of determining, describing, and understanding shifts in "sea level" proves to be far more complicated and interesting than summary sound bites suggest. Something is now known of the spatial patterns of sea level change and they are very complex, showing major regions of falling sea surface over major areas. Although the best estimates of the global average all show a positive rate of rise, partitioning the rise between heating/cooling and the addition/subtraction of fresh water lies at the very edge of modern oceanographic observational and modeling techniques. The eventual societal costs of sea level rise, whether accelerated or stable at present estimated rates, are huge and to a large extent appear inexorable.

11/13/08 Gilbert Metcalf (Tufts University)
"Analysis of U.S. Greenhouse Gas Tax Proposals"

The U.S. Congress is considering a set of bills designed to limit the nation's greenhouse gas (GHG) emissions. Several of these proposals call for a cap-and-trade system; others propose an emissions tax. This paper complements the analysis by Paltsev et al. (2007) of cap-and-trade bills and applies the MIT Emissions Prediction and Policy Analysis (EPPA) model to carry out an analysis of the tax proposals. Several lessons emerge from this analysis. First, a low starting tax rate combined with a low rate of growth in the tax rate will not reduce emissions significantly. Second, the costs of GHG reductions are reduced with the inclusion of non-CO₂ gases in the carbon tax scheme. The costs of the Larson plan, for example, fall by 20% with inclusion of the other GHGs. Third, welfare costs of the policies can be affected by the rate of growth of the tax, even after controlling for cumulative emissions. Fourth, a carbon tax — like any form of carbon pricing — is regressive. However, general equilibrium considerations suggest that the short-run measured regressivity may be overstated. A portion of the carbon tax is passed back to workers, owners of equity, and resource owners. To the extent that relatively wealthy resource and equity owners bear some fraction of the tax burden, the regressivity will be reduced. Additionally, the regressivity can be offset with a carefully designed rebate of some or all of the revenue. Finally, the carbon tax bills that have been proposed or submitted are for the most part comparable to many of the carbon cap-and-trade proposals that have been suggested. Thus the choice between a

carbon tax and cap-and-trade system can be made on the basis of considerations other than their effectiveness at reducing emissions over some control period. Either approach (or some hybrid of the two approaches) can be equally effective at reducing GHG emissions in the United States.

12/2/08 John Horowitz (University of Maryland)

"The Income-Temperature Relationship in a Cross-Section of Countries and its Implications for Predicting the Effects of Global Warming "

Hotter countries are poorer on average. This paper attempts to separate the historical and contemporaneous components of this income-temperature relationship. Following ideas by Acemoglu, Johnson, and Robinson, we use colonial mortality data to account for the historical role of temperature, since colonial mortality was highly correlated with countries' average temperatures. We argue that the remaining income-temperature gradient, after colonial mortality is accounted for, is most likely contemporaneous.

This contemporaneous temperature effect can be used to estimate the cost of global warming. We predict that a 2 degree Fahrenheit temperature increase across all countries will cause a decrease of roughly 4 percent in world GDP. This prediction is robust across samples, functional forms, and two methods for separating historical effects.

12/9/08 Richard Lindzen (MIT)

"Global Warming: What Is It All About?"

While Global Warming is frequently presented as a single phenomenon that one either believes in or denies, the real situation is, unsurprisingly, much more complex. There are, in fact, certain aspects of the issue on which a substantial measure of agreement exists: namely, that global mean temperature has increased a few tenths of a degree since the 19th Century, and that increases in atmospheric CO₂ have contributed some part of this warming. We will examine some approaches to determining exactly how much of observed warming is actually due to anthropogenic greenhouse forcing, and how explicit feedbacks are involved in these results. However, the connection of this warming to catastrophic projections is extremely tenuous. Moreover, proposed mitigation policies have little relevance to warming regardless of the level of warming expected. Understanding these 'disconnects' not only helps one to assess the overall situation rationally, but also permits one to see how the issue is being improperly exploited.