Research Statement

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My research interests are in the fields of environmental and energy economics. Specifically, my research focuses on understanding the factors driving the performance of carbon pricing programs with an emphasis on how issues of equity and distribution shape public preferences around their design and implementation. I use quasi-experimental program evaluation techniques to evaluate outcomes of existing programs as well as structural discrete-choice modeling with stated-preference survey data to characterize individual preferences over program features for which adequate revealed-preference data does not currently exist. By providing a more detailed understanding of the various channels through which carbon pricing programs can affect the economy, I hope that policymakers will be able to better implement carbon pricing programs, and any necessary complementary policies, in a more equitable way.

My job market paper *Preferences for Internal Carbon Pricing Programs* (with Trudy Ann Cameron and Steve Mital) uses data from a stated-preference survey of a large public university to estimate a structural choice model of willingness to pay (WTP) for non-governmental "internal carbon pricing" programs. In an internal carbon pricing program, which have been adopted by over 500 firms and universities, a firm voluntarily adopts a charge on their emissions in order to fund green projects, encourage emission reductions or to signal sustainability. In our choice model, a respondent's WTP varies by the distribution of the program's costs across stakeholders, the way the revenues are spent, and by the respondent's individual characteristics. We find that these distributional features are an important determinant of overall willingness to pay for internal carbon pricing. Individuals prefer programs (holding the cost to the respondent constant) where polluters pay a greater proportion of the costs and the state government shares some of the cost burden. Respondents prefer that revenues are spent on carbon reduction projects as opposed to returning those revenues to the university to spend on academic programs (i.e. as revenue recycling).

We are interested in using the survey data to develop a model for "benefit-transfer" exercises across different campuses. A benefit transfer uses a model estimated in one setting in order to calculate the same parameters in a different setting where new data collection is infeasible. Our structural choice model can simulate a wide range of campus populations — even if they differ from the originally studied university — and is therefore well suited to this task. We are currently in discussions with another university to obtain the administrative data needed to use our estimated model to simulate the distribution of willingness to pay on their campus. This would allow us to assess how our original estimates would differ for a university

with a substantially different student body. Contingent on future funding, we could also expand our survey to additional universities, perhaps including liberal arts colleges or universities with a wider range of professional programs than our surveyed institution. This would offer an opportunity for us to "ground truth" our benefit transfer model and therefore allow methodological research to develop best-practices for benefit-transfer exercises using structural choice models.

In a separate paper, I utilize quasi-experimental program evaluation methods such as synthetic control and semi-parametric matching estimators to assess the effect of California's carbon cap-and-trade program on the distribution of non-carbon co-pollutants. Environmental Justice groups during the legislative and rulemaking process have expressed worries that the flexibility polluters have in determining the location of emission reductions in a cap and trade system results in these reductions occurring in a way that disproportionately benefits communities with higher socio-economic status while communities with lower socio-economic status experience smaller, or no, improvements. While the *spatial* distribution of carbon-dioxide itself does not directly matter when calculating damages, the *spatial* distribution of co-pollutants such as nitrogen oxides (NO_x) and sulfur, which are produced in the same industrial processes as CO_2, have local adverse health effects. My paper "*The Effect of California's Carbon Cap and Trade Program on Co-pollutants and Environmental Justice: Evidence from the Electricity Sector*" examines whether these concerns are supported by the data. I use information about NO_x and sulfur emissions for almost every electricity plant in the United States to construct valid counterfactuals (for the emissions of California's cap-and-trade plants had they not participated). I find no evidence of either an increase in co-pollutants or evidence that the quantity of carbon reduction is systematically related to the demographic characteristics of the plant's surrounding community. In fact, my results suggest that on average co-pollutant emissions have decreased as a result of the introduction of carbon pricing. The paper is currently under review.

An additional project, *"The Role of Carbon Levies on Resource Rents: Evidence from Oil and Gas Land Auctions in Western Canada"* (With Dana Andersen and Long Zhao) uses a spatial border-discontinuity to estimate the effect of carbon taxes on auction prices for western Canadian oil and gas land leases – a major source of future carbon dioxide emissions. In addition to contributing to our understanding of the costs and mechanisms of carbon abatement caused by market based instruments, the paper contributes to our understanding of the effect of carbon taxes on a major source of government revenue for the western Canadian provinces. Accurate estimates of the amount of auction revenue lost due to a carbon tax are needed in order to design revenue recycling programs that adequately compensate the losers

from a carbon tax. We hope to circulate a draft in the near future.

My future research will continue to study the effects of carbon taxes and other climate change related policy. A project currently in its early stages will evaluate government efforts to promote more energy efficient co-generation in the U.S. with a differences-in-differences strategy that exploits state level variation in these policies. Another project currently in progress (with Trudy Ann Cameron) involves a general population survey of the state of Oregon, to explore the individual willingness-to-pay for sub-national carbon pricing programs. I am also interested in exploring methodological issues in discrete choice modeling such as response/non-response adjustments as well as methods of incorporating distributional concerns into benefit-cost analysis. Lastly, while my past and current research has been focused on carbon pricing, I am always open to explore other areas of economic policy where distributional aspects of benefit-cost analysis are important or where stated-preference methods can be usefully applied.