Joshua Murphy

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Citizenship   Canadian

Research Interests   Public Economics
Environmental Economics
Applied Microeconomics

Teaching Interests   Public Economics
Environmental Economics
Quantitative Methods

Education

2010-present   Ph.D., Economics, University of Toronto (expected 2017)

Dissertation: "Costs, Benefits, and Efficiency of Air Quality Regulation"
Committee: Robert McMillan (supervisor), Kory Kroft, and Eduardo Souza-Rodrigues

2010   M.A., Economics, Queen's University

Highlights: Scarthingmoor Prize for Best Essay in Economics

2008   B.A. (Honours), Economics (major) and Psychology (minor), Queen's University

Highlights: Dean's Honour List with Distinction (top 3% of arts students)

Research Papers

"The Value of Reducing Power Plant Emissions: New Evidence from the Clean Air Interstate Rule" [Job market paper]

"The Benefits of Reducing Particulate Pollution: Evidence from the U.S. Clean Air Act"

"The Air Quality and Health Effects of the U.K. Clean Air Act of 1956" (with Robert McMillan)

"Deforestation in the Amazon: Measuring the Effects of the Priority List" (with Robert McMillan and Eduardo Souza-Rodrigues)

"Competition, Parental Involvement, and Public School Performance" (with Robert McMillan)

Awards

Royal Bank Fellowship in Economics and Public Policy, 2015
Doctoral Completion Award, University of Toronto, 2014 and 2015
Dorothy J. Powell Scholarship, University of Toronto, 2013
Ontario Graduate Scholarship, 2012
Doctoral Fellowship, University of Toronto, 2010-2013

Professional Experience

2010-2015   Research Assistant, University of Toronto
- Robert McMillan (4 yrs), Michael Smart (2 yrs), and Dan Trefler (1 yr)

2011-2015   Graduate Help Desk, University of Toronto Mississauga
- One-on-one help for students in core economics courses
- Advised students on their empirical projects
- Helped students improve their essay writing

2010-2015   Teaching Assistant, University of Toronto (various courses*)*
- Main courses: Public Economics, Urban Economics, Quantitative Methods
- Allocated TA resources and oversaw course administration as lead TA
- Prepared and delivered a mini-course in Stata to M.A. Economics students
- Gained experience presenting to large audiences by delivering weekly tutorials to high enrollment classes
- Interacted with students during office hours, over e-mail, and on messaging boards
- Provided students with feedback by grading essays, assignments, and exams

Summer 2009   Researcher, Institute for Competitiveness & Prosperity, Toronto
- Used data from the Canadian Census to examine differences in education and economic outcomes among immigrants and native Canadians to highlight the challenges immigrants face in the labour market
- Developed data-based profiles of Canadians in persistent poverty to improve targeting of social programs and focus policy discussion
- Reviewed alternative methods for pricing greenhouse gas emissions

Invited presentations

May 2015   Discussant for "Severe Air Pollution and Labor Productivity" by Teng Li, Haoming Liu, and Alberto Salvo at the 3rd Northeast workshop on Energy Policy and Environmental Economics, Yale University

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References

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Dissertation Abstract

The Value of Reducing Power Plant Emissions:
New Evidence from the Clean Air Interstate Rule
(Job Market Paper)

Air pollution is the world's most serious environmental health risk, responsible for an estimated 3.7 million premature deaths annually. A key issue facing regulators is the precise extent to which air pollution should be reduced. As pollution-generating activities involve unpriced externalities, we do not have ready market measures of the relevant costs and benefits. Credible microestimates are thus needed. I provide such estimates for the release of sulfur dioxide and nitrogen oxides emissions from power plants, an important source of air pollution in several countries. I do so using the first application of the sufficient statistics approach in this setting. That is, I specify a general equilibrium model of health, consumption, production, power generation, and resource extraction, derive a formula for the change in social welfare due to a small reduction in emissions, and estimate inputs to the formula using quasi-experimental variation. The formula simplifies to a comparison of marginal benefits (primarily in terms of reduced mortality risk, monetized using the value of a statistical life) less the marginal cost of abatement. Measurement of the inputs is based on rich, exogenous variation induced by the Clean Air Interstate Rule, a recent policy that cut power plant emissions of sulfur dioxide and nitrogen oxides in the United States. To estimate the health effects of a permanent reduction in emissions, I exploit the substantial cross-county variation in air quality improvements that the rule's emission caps induced. Using comprehensive county-level mortality statistics along with this exogenous variation in air quality, I find that a one unit decline in long-term exposure to air pollution causes a 1-2 percent reduction in the annual probability of death. Mine represent the first causal estimates of the effects of long-term exposure to the harmful pollutants that power plants are responsible for (sulfate and nitrate particles). They are also unique in that they apply to a country where air pollution is low by international standards. To estimate the second input to the welfare formula – the marginal cost of abatement – I exploit cross-state variation in the degree to which the rule's emission caps required states to reduce the emission intensity of their power generation. Regressing this measure of treatment intensity on the change in a state's electricity price between the 'pre' and 'post' periods provides information that, under the structure of the model, I use to calculate the costs of removing an additional ton of emissions. Applying the framework I develop, my estimates imply that further cuts to power plant emissions would be worthwhile: marginal benefits exceed marginal costs by a large margin. In addition to providing useful information to regulators in the United States, this paper delivers results that should be of interest to regulators elsewhere. My quasi-experimental estimates indicate that exposure to air pollution is more lethal than previously thought, and I find no evidence of a threshold concentration below which the health effects of further improving air quality begin to taper off (*i.e.*, the mortality dose-response function is linear).

The Benefits of Reducing Particulate Pollution:
Evidence from the U.S. Clean Air Act

This paper re-examines the effect of a county's regulatory status under the U.S. Clean Air Act Amendments of 1970 on the change in exposure to air pollution within the county, the 'first-stage' underlying causal estimates of the benefits of reducing air pollution in several studies. Relying on data thought no longer to exist, I find that one of the commonly-used measurement approaches – a regression-discontinuity estimator – is invalid, as the assumed differences in regulatory status among counties that barely met and barely failed the

national air quality standards are not present. The other commonly-used measurement approach – a difference-in-differences estimator – delivers inflated estimates of the effects of regulation on air pollution. In a Two-Stage Least Squares setup, the consequence of an inflated first stage is an attenuated second stage. The literature thus significantly *understates* the benefits of reducing air pollution.

The Air Quality and Health Effects of the U.K. Clean Air Act of 1956 (with Robert McMillan)

We use exogenous variation in air quality improvements caused by the U.K. Clean Air Act of 1956 to measure the health benefits of reducing air pollution from extremely high levels. The legislation targeted emissions from open coal fires that were widely used in private dwellings for heat, hot water, and cooking, granting local authorities power to establish 'smokeless zones'. Due to the initially limited supply of alternatives to coal, this power was exercised almost exclusively in so-called 'black' identified by the central government as particularly in need of smoke control. Using concentration readings from the large network of air pollution monitoring stations distributed throughout the U.K., we find that local authorities in 'black' areas experienced large and persistent reductions in air pollution relative to local authorities outside of those areas. We are in the process of linking these long-term, regulation-induced reductions in air pollution to improved health outcomes using data from the ONS Longitudinal Study, which tracks individuals' economic information and health status over multiple decades.