

Research Statement

Phuong Ho *

I am an applied microeconomist with research interests in industrial organization, environmental and energy economics, and economics of minorities (non-labor issues). The long-term goal is to apply industrial organization methodology to study the effects of regulatory policies and environmental policies, thereby evaluating the effectiveness of the policies. In particular, governments tend to intervene in markets to maintain competitive trade practices, to correct market failures, or to protect vulnerable parties. Industrial organization methodology is useful because it helps understand the economic incentives of demand-side agents and supply-side agents in markets to examine these agents' responses to the policies.

In my job market paper, "Environmental Protection, Interjurisdictional Shipment, and Demographic Distribution of Solid Waste Disposal," I study the effects of environmental protection policies on the spatial and demographic distribution of waste disposal. Specifically, using a novel data set on intercounty waste flows in California and a structural model of haulers' decisions about where to deposit waste from each county, I explore the effects of "not-in-my-backyard" policies such as county bans and county taxes on out-of-county imports, and the effects of fuel taxes.¹ I find that waste is currently more likely to be hauled to disposal facilities in high percent black and Hispanic communities than white communities, even once I control for income, disposal fees, and transport distances, suggesting that unobserved characteristics of facilities and neighborhoods matter in haulers' decisions. I account for these factors by allowing for facility fixed effects in the demand model for waste disposal facilities. Results show that policies that limit waste flows would reduce intercounty waste transport, but they generally would not lead to a more equitable distribution of trash. These policies tend to lead to substitution of waste away from facilities near white residents and toward facilities near Hispanic residents, potentially exacerbating distributional concerns.

In a work in progress that complements to the previous study, "Race, Ethnicity, and the Distribution of Waste Flows," I revisit questions on environmental justice in solid waste industry. Literature has documented an uneven distribution of environmental hazards among race groups, but they focus on total concentration of hazard at a site. I, on the other hand, distinguish between multiple waste flows from different origins coming to the facility. This gives four benefits. First,

*Department of Economics, University of Arizona. Email: phuongho@email.arizona.edu. Website: www.u.arizona.edu/~phuongho

¹The NIMBY policies are of interest because a number of federal bills have been proposed to allow states and local governments to restrict interjurisdictional waste flows. The fuel taxes are important environmental regulation tools that aim to reduce pollution and the possibility of global warming. Although fuel taxes are not directly intended to the solid waste industry, they are advocated to compensate for the externality on the route of transporting an environmental nuisance such as trash.

I identify the exposure disparities between racial/ethnic minority groups and white within neighborhoods of hazard sites. This contrasts to the literature that has compared communities within facility's buffers and other areas that are far away from hazards, which may be confounded by the initially disproportionate siting of facilities. Second, I separate the exposure disparity from economic characteristics of facilities that affect their receiving waste quantity such as disposal price and transport cost. Third, I identify the disparity that is not related to political capability by controlling for intercounty flows vis-à-vis within-county flows. Fourth, I examine whether the disparity is an urban-rural story by exploiting the variation in waste flows that come from the same county to different destinations within a certain distance.

In another work in progress, "The Effects of Flow Controls and Environmental Regulations in Solid Waste Industry," I add the supply side to the structural model in my job market paper to study the equilibrium effects of waste flow controls and environmental regulations. I assume disposal facilities are competing in price and consider how disposal facilities change their price strategies in response to the NIMBY policies and environmental policies. I further distinguish the behavior of public facilities and private facilities to study another class of waste flow control besides interjurisdictional waste control. In 1994 the Supreme Court prohibited flow control that designate where waste must be disposed of but they has recently revealed a more flexible view by upholding the county ordinances that directed all locally generated trash to local publicly owned processing facilities, citing that the previous case had presented a privately owned facility.² I, hence, study the effects of such flow controls in the market where private facilities are competing in prices and public facilities are setting prices at average costs.

In the next five years, my research aims to continue shedding more light on the solid waste industry. While there are a few economic studies about the effects of hazardous waste on housing values and infant health, little is known about solid waste. I, hence, aim to study the effects of solid waste on housing prices, water quality, and human health. Additionally, I propose a paper that studies the role of transfer stations in exacerbating intercounty waste and long-haul waste.

Other projects

Besides studies on the solid waste industry, I have been working on other topics of industrial organization. In a joint work with Toby Daglish, and Yiğit Sağlam (Daglish, Sağlam, and Ho, 2017), we model a spectrum auction where firms purchase units to participate in a constrained, multi-product, downstream market. We use dynamic programming techniques to numerically solve for the optimal bidding strategy in a clock auction. Firms value constraining competitor market power, so incumbents often bid aggressively to shut out entrants. We find that high cost firms may hold up the market, so the auction may be inefficient and generate zero revenue. An auction may

²See *C&A Carbone Inc. v. Town of Clarkstown, New York* (1994), and *United Haulers Association, Inc. v. Oneida-Herkimer Solid Waste Management Authority* (2007).

be optimal for a regulator maximizing total surplus. A regulator maximizing auction revenue sets reserve prices high enough to restrict spectra sold, effectively behaving as a monopolist.

In a working paper, “Nonlinear Pricing, Biased Consumers, and Regulatory Policy,” I re-examine regulated non-linear pricing in light of recent evidence regarding electricity customers respond to changes in average price rather than to changes in marginal price (Ito, 2014). I find that optimal regulated non-linear pricing under average price response behavior is independent of the consumer type distribution. Fixing consumer preferences and the type distribution, increasing per-unit prices may be optimal when consumers respond to average price, while decreasing per-unit prices are optimal when consumers respond to marginal price. These results suggest that the equity-efficiency trade-off associated with increasing block tariffs may be less severe than previously believed. Previous literature believes increasing per-unit prices are not efficient although policy makers have used price schedules with increasing block tariffs to regulate important markets such as water and electricity. These tariffs are argued to promote equity, resource conservation, and revenue stability instead of efficiency.

References

- Toby Daglish, Yiğit Sağlam, and Phuong Ho. Auctioning the Digital Dividend: A model for spectrum auctions. *International Journal of Industrial Organization*, 53:63–98, 2017.
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