

UTILITY REBATES, EMISSION SPILLOVERS AND LOBBYING: ESSAYS ON ENVIRONMENTAL ECONOMICS

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This thesis deals with three different environmental issues. The first essay is a policy evaluation of the Energy Star eco-labelling programme. The second essay uses spatial econometric tools to capture spatial spillovers in emissions while the last essay uses firm heterogeneity to model the decision of polluting firms to lobby and/or abate.

In the first essay (joint with Sumeet Gulati) we estimate the increase in the market share of ENERGY STAR-qualified appliances that can be attributed to targeted cash rebates offered by utility companies. To estimate the impact of these incentives we use the variation in timing and size of the utility rebates across the US states. We then use these estimates along with information on the average energy saved by using an ENERGY STAR appliance relative to a non-ENERGY STAR appliance to provide an estimate on the cost per tonne of carbon saved by the rebate program. Our results show that a dollar increase in the rebate leads to a 0.3% increase in the share of ENERGY STAR-qualified clothes washers while the effect of rebates is not significant for dishwashers and refrigerators. Assuming a redemption rate of 40%, we calculate the cost of saving a tonne of carbon through the clothes washer rebate program to be approximately \$171. The corresponding cost of a megawatt hour saved (approximately \$35), is lower than the estimated cost of building and operating an additional power plant and the average on-peak spot price between 2001 and 2006. We conclude that the ENERGY STAR clothes washers rebate programs are a cost-effective way for utilities to reduce energy demand. This research is significant because an analysis of the costs of this policy could inform the types of policies that should be used to reduce individual greenhouse gas emissions.

In the second essay I use data from Canada's emission inventory, the National Pollutant Release Inventory (NPRI), to investigate the existence of spatial spillovers in pollution abatement across firms in the manufacturing sector. These spillovers are incorporated using a model with

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technological spillovers that are dependent on distance between firms as well as the presence of a regulatory threat caused by the environmental exposure faced by consumers. The pollution abatement spillovers are the result of the interaction between the free-rider effect and the technological spillovers. If the free-rider effect dominates the technological spillovers we will have cleaner firms surrounded by dirtier firms while firms with similar environmental performance will tend to cluster together if the technological spillovers dominate the tendency of firms to free-ride. Using the NPRI data I find that the technological spillovers outweigh the free-rider effect so that the environmental performance of firms tend to be similar in nature when they are closer to one another.

In the last essay I use firm-level characteristics to make predictions about the lobbying and abatement choice of firms in a model consisting of two non-cooperating firms. There are three sources of firm heterogeneity in my model, viz. the marginal cost of production, the emission intensity and the marginal cost factor of abatement. I find that the decision to lobby or abate or do both depends on the cost-effectiveness of lobbying against that of abating. A firm will abate and not lobby if its effective marginal abatement cost, which depends on output, is lower than a threshold value. An interesting observation is that, under my assumption of perfect and complete information, the model predicts that in most cases the firm with the lower effective marginal abatement cost will not lobby but will free-ride on the lobbying effort of the other firm.