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Trade-offs Between Agricultural Practices and Environmental Quality: An Econometric Assessment of Chemicals Use and Wildlife Loss

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Abstract

The motivation of this work is based on the empirical evidence showing that pesticides use has direct consequences on wildlife. Such relationships are however not straightforward; they are characterised by complexity, interdependence and uncertainty. The appropriate model specification of the agricultural production function for productivity estimation of damage control inputs has dominated the debate since the first research efforts. However, less attention has been paid to farmer adaptations in response to a change in pesticide prices.

The analysis of farmer's adaptations to economic policies is essential for designing effective instruments. Taxes on pesticide use have prevailed as an effective economic instrument. However, relatively research effort has been devoted to farmer's adaptations to taxes. A single tax on all pesticides is possibly the most cost-effective instrument, but is likely to be ineffective since it would not take into account the basic differences on toxicity levels and the amount of damage to environment when different pesticide are used. A tax on a single pesticide could remedy such situation. However, a farmer dealing with a change in pesticide price will allocate the whole own resources accordingly. There is evidence that a pesticide tax on a pesticide modifies the use of another pesticide (possibly more damaging) which is simultaneously used by a farmer before the tax was imposed. Hence, besides the reduction of the targeted pesticide, these 'side' effects have to be assessed when designing policy instruments. If the aforementioned side effects are more damaging to the environment, a single pesticide targeted instrument may incur larger benefits to society.

The analysis centred on production technology modelling using a parametric approach. Using a multi-crop production framework, the substitutability between pesticides and farmer's adaptations to changes in pesticides price is analysed, where each farmer produces several crops and uses several pesticides. The underlying relationships will be assessed through an econometric approach that takes into account the interactions among agricultural practices (pesticide use) and nonpoint pollution with impacts on environment. It is essentially intended to explore issues around an optimal pesticide regulation though more effective economic instruments.

Keywords: Damage function, econometrics, Mexico, pesticides, wildlife