Pesticide Regulation: Unintended Consequences of Over-Conservative Risk Assessment on the Agricultural & Food Sector

C. Robert Taylor
Professor Emeritus of Agricultural Economics & Public Policy at Auburn University

CropLife America-RISE Spring Conference
Arlington, VA
April 13, 2016
Conservative (Uncertain) Risk Standards

- May impose significant unintended risks (and costs) on the food economy
- Why have a different risk standard for listed species than for the plethora of risks and uncertainty facing the human species?
- Are FQPA (and other) risks additive as implied by the policy framework?
The Macro or Aggregate World

- "Everything is Connected to Everything Else"
  - A fundamental ecological principle
  - But also a fundamental characteristic of the aggregate economic system

- Unintended Consequences
  - May result from a focus on only one part of the household, critters or humans
    - some negative, some positive consequences
  - May result from a focus on static, current impacts, rather than dynamic, long-run impacts
  - May result from a micro policy focus when a macro focus is appropriate
The Macro or Aggregate World

* **Micro-Macro Paradoxes**
  * Tendency to reason or analyze issues at the micro level
  * But what appears true at the micro level may have the opposite macro effect
    * e.g. Introduction of a new pesticide that increases crop yield and is profitable for a farmer to use
      * But widespread adoption increases production which lowers crop price
      * In the aggregate, farmers as a group may be *worse* off
      * While consumers may be *better* off

* **Unintended and Paradoxical Consequences**
  * May apply to “expected” economic and ecological impacts
  * But also apply to “risk” considerations
Pesticide and ESA risk assessment

While “everything may be connected to everything else,” there is often a total disconnect between aggregate economic models, and ecological and environmental models

* Ecologists and economists are seemingly on different planets!

Often a disconnect between FQPA or ESA risk assessment, and more mundane economic risks affected by policy

* e.g. Higher food prices resulting from ESA or FQPA action that bans use of a pesticide or takes land out of crop production
  * May result in an inadequate diet for low income people, with attendant health risks
  * Typically results in increased food imports that may have higher residues or unhealthy contaminants

* Disconnect partly due to legislation, but may also be due to agency and court interpretations
Risk or Uncertainty?

- A Distinction
  - **Risk**: Can assign probabilities and use decision models grounded in economics and statistics
  - **Uncertainty**: Difficult or impossible to assign probabilities, even subjective

- Considerable rhetoric about using the “best science” in pesticide decisions
  - But there is considerable “uncertainty” about that science (including social science)
  - Uncertainty about validity of some ecological (and economic) theories
Are Risks Additive, as Implied by the Risk Cup?

* **NO!**

* “Everything connected to everything else” strongly suggests joint probability distributions
  * Risks to species or to the food system arising from different sources are not additive as implicitly assumed in the FQPA (and other) Risk Cup

* In terms of uncertain risks, broadly defined, the whole may be greater than the sum of the parts .... or it may be less!
Common View of the FQPA Risk Cup

- residential use
- drinking water
- apples
- corn
- drinking water
- residential use
- food uses

Aggregate Risk Cup
Non-additivity of risks can be likened to a chemical reaction that occurs in the cup.
The Risk Cup is Best Viewed as an Uncertain Risk Cup
ESA Mitigation Costs

* Include
  * Direct expenditures
  * Indirect and/or unintended economic costs
    * Higher food prices
    * Lower farm income
    * General (non-ESA) Risk premium/discounts
Basic Economics: Mitigation Cost & Risk Tradeoffs

Mitigation Cost

ESA Assessed (uncertain) Risk for a Species

Unattainable

Unreasonable above frontier

Mitigation Cost Frontier

Low Risk

High Risk
Consequences of Reducing ESA Species Risks

Mitigation Cost

ESA Assessed (uncertain) Risk for a Species

Zero Risk

Negligible Risk with Intervention

Assessed Risk without Intervention

Mitigation Cost Frontier
Possible Outcome of ESA Policy Choices

- **Mitigation Cost**: Zero Risk
- **Risk with Intervention (policy goal)**: Negligible Risk
- **Assessed Risk without Intervention**: Optimal
- **Too Costly & Does Not Meet Policy Goal**
- **Mitigation Cost Frontier**
Different Species, Different Mitigation Costs

Mitigation Cost

Frontier Species 1

Mitigation Cost

Frontier Species 2

ESA Assessed (uncertain) Risk for a Species

Assessed Risk without Intervention
Different Costs Suggest Different Risk Standards

- Mitigation Cost Frontier Species 1
- Mitigation Cost Frontier Species 2

ESA Assessed (uncertain) Risk for a Species

Zero Risk

Assessed Risk without Intervention
Conservative (Uncertain) Risk Standards for ESA

- May impose significant risks (and costs) on the food economy
- Why have a different risk standard for listed species than for the plethora of risks and uncertainty facing the human species?
- What would be the economic and ecological consequences of using a highly conservative risk standard for other policy decisions?
  - FQPA
  - Food policy
  - etc
Challenges

* Modeling of uncertain risks, and uncertain economic and ecological effects is quite challenging
  * Ecologists and economists need to get on the same planet!
* Identifying and measuring the “major” unintended consequences and paradoxical effects to reduce “surprises” after a policy has been implemented
  * For risks as well as expected consequences
* Cannot chase down every aggregate economic and ecological effect
  * Even if we could, it would not likely be a sound social investment, as the costs of such an exercise would likely be much greater than expected benefits of fine-tuning policy
* But we can do more, which will likely have beneficial social, economic and ecological outcomes