

AGENT BASED MODELING FOR FARM LEVEL POLICY ANALYSIS

James Nolan
Richard Schoney
Derek Brewin

FLP supported students

Tyler Freeman

Adam Arsenault

Peter Stolniuk

Leigh Anderson

FARM LEVEL ACTIVITY

- ✘ Heterogenous individuals (utility, endowments)
- ✘ Local actions/decisions
- ✘ Feedback (dynamics) – actions of an agent can affect the decisions of others
- ✘ All these processes are layered and must be solved simultaneously

WHERE AGENTS ENTER

- ✘ CRAM – designed using static, non-linear optimization methods
- ✘ Optimizes through consumer and producer surplus (general equilibrium)
- ✘ Equilibrium economic models shed little insight on dynamical properties of market economies with decentralized adjustment mechanisms
- ✘ Is farm level modeling a complex system?

CHARACTERISTICS OF COMPLEXITY (THE SANTA FE DEFINITION)

1. Dispersed interaction among heterogeneous agents acting locally on each other in some space
2. No global controller exploiting all opportunities or interactions in the economy - though there may be weak global interactions
3. Cross-cutting hierarchical organization with many non-linear interactions

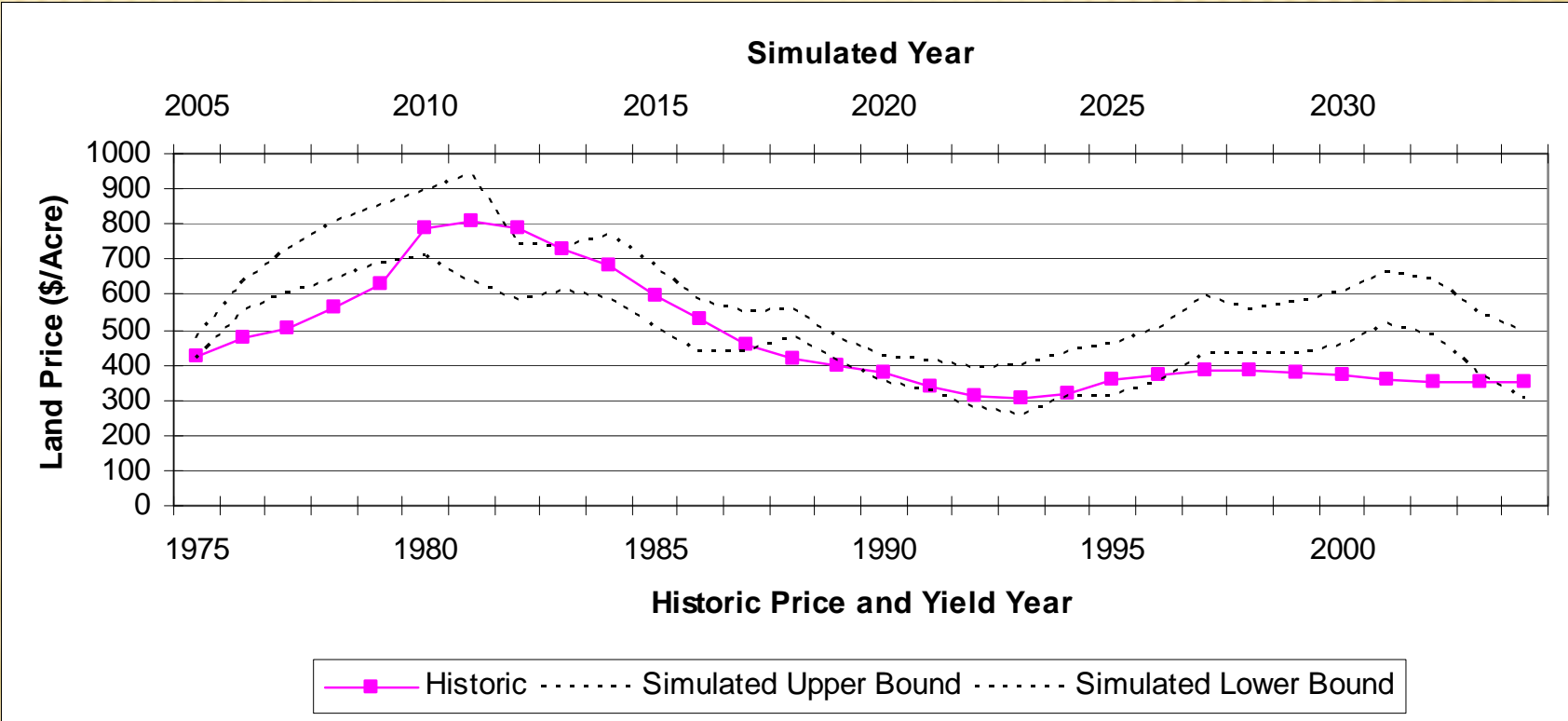
WORLD OF BOUNDED RATIONALITY, NOT RATIONAL EXPECTATIONS

4. Continual adaptation by learning and evolving agents
5. Perpetual novelty as new markets, technologies, behaviors and institutions create new niches in the system
6. So-called out-of-equilibrium dynamics with either zero or many equilibria - system unlikely to be near a global optimum

IMPLICATIONS OF COMPLEXITY FOR ECONOMIC RESEARCH

- ✘ Since only local relationships among individuals are assumed, aggregate behavior emerges rather than being imposed
- ✘ What happens on aggregate may not simply be the sum of what happens at the individual level (“fallacy of composition”) - in contrast to representative agent models

VALIDATION: LAND PRICES- CAR 6B



POLICY RELATED FINDINGS

- ✘ Farm size distribution
- ✘ Land markets and prices
- ✘ Effects of subsidy programs
- ✘ Types of farms
- ✘ Tipping points (elevators)