Testing the Reliability of Wholesale Power Market Designs

An Iterative Participatory Modeling (IPM) Approach

Presenter:

Leigh Tesfatsion
Professor of Economics and Mathematics
Department of Economics
Iowa State University
Ames, Iowa 50011-1070
http://www.econ.iastate.edu/tesfatsi/
tesfatsi@iastate.edu
What is Agent-Based Computational Economics (ACE)?

- **Culture-dish approach** to the study of decentralized market processes

- **Computational study** of economic processes modeled as dynamic systems of interacting agents

- **ACE Handbook**
  [www.econ.iastate.edu/tesfatsi/hbace.htm](http://www.econ.iastate.edu/tesfatsi/hbace.htm)

- **ACE Website**
  [www.econ.iastate.edu/tesfatsi/ace.htm](http://www.econ.iastate.edu/tesfatsi/ace.htm)
Four Main Strands of ACE Research

- **Empirical Understanding** (e.g., possible explanations for macro regularities)
- **Normative Understanding** (e.g., market design)
- **Qualitative Insight/Theory Generation** (e.g., self-organization of decentralized markets)
- **Methodological Advancement** (e.g., representation, visualization, validation)
“Dynamic Testing of FERC’s Proposed Wholesale Power Market Design: An Agent-Based Computational Approach”

Junjie Sun
Economics Ph.D. student, ISU
and
Leigh Tesfatsion
Professor of Economics and Mathematics, ISU

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(Extension of earlier project work with Deddy Koesrindartoto
Econ Department, SBM-ITB, Bandung, Indonesia)
Part of a Larger-Scale NSF Project on Integrated Energy Systems

- Jim McCalley, Sarah Ryan, Steve Sapp, and Leigh Tesfatsion, “Decision Models for Bulk Energy Transportation Networks”

**Goal:** Construction of an integrated energy model (electricity, coal, natural gas, water) that permits
- *comprehensive assessment* of improved production, storage, transportation, and delivery alternatives;
- *prediction* of the effects of market design changes on energy system performance.

**Approach:** Use *IPM* to develop a two-layer empirically-based model: an *agent-based market layer* operating over a *transport network layer*. 
Iterative Participatory Modeling (IPM)

See, e.g., Barreteau et al. (JASSS 2003)

Stakeholders and researchers from multiple disciplines join together in repeated looping through four stages of analysis:

- Field work and data collection
- Role-playing games
- Model development and implementation
- Intensive computational experiments