



Jul 11th, 11:50 AM - 12:10 PM

A novel approach to parameterizing utility functions for agent-based market models of resource choice

Dawn Parker
University of Waterloo, dcparker@uwaterloo.ca

Yu Huang
University of Waterloo

Robert Babin
University of Waterloo

Jeff Casello
University of Waterloo

Xiongbing Jin
University of Waterloo

See next page for additional authors

Follow this and additional works at: <https://scholarsarchive.byu.edu/iemssconference>



Part of the [Civil Engineering Commons](#), [Data Storage Systems Commons](#), [Environmental Engineering Commons](#), [Hydraulic Engineering Commons](#), and the [Other Civil and Environmental Engineering Commons](#)

Parker, Dawn; Huang, Yu; Babin, Robert; Casello, Jeff; Jin, Xiongbing; Pi, Xinyue; and Sullivan, Veronica, "A novel approach to parameterizing utility functions for agent-based market models of resource choice" (2016). *International Congress on Environmental Modelling and Software*. 7.
<https://scholarsarchive.byu.edu/iemssconference/2016/Stream-D/7>

This Event is brought to you for free and open access by the Civil and Environmental Engineering at BYU ScholarsArchive. It has been accepted for inclusion in International Congress on Environmental Modelling and Software by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.

Presenter/Author Information

Dawn Parker, Yu Huang, Robert Babin, Jeff Casello, Xiongbing Jin, Xinyue Pi, and Veronica Sullivan

A novel approach to parameterizing utility functions for agent-based market models of resource choice

Dawn Parker^a, Yu Huang^a, Robert Babin^a, Jeff Casello^a, Xiongbing Jin^a, Xinyue Pi^a, Veronica Sullivan^a

^a*School of Planning, Faculty of Environment, University of Waterloo, Canada
(dcparker@uwaterloo.ca)*

Abstract: Theoretical economic choice models posit that agents make resource allocation decisions based on the “utility,” or subjective satisfaction that they receive from alternative choices. Utility allows agents to rank choices and potentially apply optimization algorithms to these choices. Utility, however, is not measurable in an empirical context. Thus, modelers alternatively estimate linear empirical functions that associate factors with observed choices and/or market prices. While these linear functions can include factors that reflect multiple social and natural dimensions of decision making, they are not suitable for optimization (even using assumptions of bounded rationality) or for representing synergies and substitutability between factors. We present a novel approach to empirical utility function parameterization. Using surveys, we are gathering information on the relative preference ranking of factors that affect agents’ observed home purchase or rental decisions, as is standard in such surveys. We are also gathering information on how close each agent perceives the value of each factor to their realized decision to their ideal choice, giving us additional information to parameterize an empirical utility function. In short, we will observe their choices, their stated relative importance of factors, and the distance from their ideal for each factor. These surveys are part of a larger project to build and validate agent-based models of residential housing markets and transportation choices at the regional scale. Through partnership agreements, we will have access to time-series data, facilitating out-of-sample validation, as well as opportunities for expert validation with government officials and real-estate professionals.

Keywords: Agent-based modeling; decision making; markets