



**MUMS Agent-Based Modeling and
Uncertainty Quantification Workshop
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SPEAKER TITLES/ABSTRACTS

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“Reduced-Scales and Alternative Representations for Large/Full-Scale Agent-based Models”

We have calibrated an ultra-large scale model of the U.S. economy involving 120 million employee agents who interact to form some 6 million firms. We use firm-level micro-data on the entire private sector. These data feature many extreme properties, e.g., Pareto-distributed firm sizes (by multiple measures), heavy-tailed growth rate/fluctuations (e.g., log-Laplace distributions that become lognormal over long time scales), labor productivity approximately Lévy-distributed with a power law high productivity tail, and so on. This model is VERY expensive to evaluate and we have worked hard to parallelize it on custom hardware (100s of cores, TB of RAM, GPU, etc.). However, an alternative to make the model more usable is to create reduced-scale/form models. Reduced-scale models maintain the economic interpretability of the model but require rescaling all the output measures, of which there are nearly 50 in this case, with rescaling being heterogeneous across these measures and non-trivial with all the heavy-tails in the data. Alternatively, reduced-form models may maintain direct commensurability of output to data but make behavioral/policy interpretation difficult. This talk will map some of the tradeoffs between model intelligibility, usability, and scalability.