

Overview of Charge

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National Center for Environmental Economics

U.S. Environmental Protection Agency



Overview of Charge

- Review underlying framework for SAGE
 - Built for eventual use in prospective evaluation of social costs and economic impacts of regulations
- Analyses based on SAGE undergo additional public, and possibly peer, review
 - All regulatory decisions and analyses undergo public review and comment
 - Use of SAGE to evaluate the effects of a specific regulation, including modifications to the model to better represent regulation, is potentially subject to additional peer review

Overview of Charge

- Divided into three sections:
 - Technical accuracy and defensibility of underlying framework of the SAGE CGE model
 - Proposed approach to versioning and peer review of future model updates
 - Priorities for near-term improvements to the SAGE modeling framework

Materials Provided

- Model documentation, build stream, source code, and data
 - Explanation/justification for each major model or parameter assumption
 - How to run model, including examples for simple scenarios and model diagnostics
 - Explanation of some approaches for representing environmental regulation in model
 - Examples to examine how model behaves when different features are turned off/on
- Memo on versioning and peer review of future model updates
- Memo on model updates anticipated in next 2-3 years

Additional Materials Provided

- As background, also making available documents from 2015-2017 SAB economy-wide model review:
 - SAB final report - recommendations to EPA with regard to CGE modeling in context of rulemaking
 - EPA social cost white paper – rulemaking context in which EPA operates, types of analyses typically performed, and potential role CGE models may play
 - Recently published paper that evaluates when general equilibrium and engineering cost estimates differ

Technical Accuracy and Defensibility

1. Is the model documentation clear, accurate, and transparent? Do you have any specific suggestions for how to improve it?
2. Are the model structure and assumptions reasonable and consistent with economic theory?
3. Are the inputs used in the model (e.g., elasticities, social accounting matrix) reasonable and reflective of the peer-reviewed literature?
4. Does the model produce intuitive and expected results?

Technical Accuracy and Defensibility

To help inform these questions,

- The model documentation explains structure and underlying assumptions, including justifications for our approach when possible
- Several model features can be turned off-or-on to enable reviewers to evaluate how they affect outcomes (e.g., static vs. dynamic; putty-clay vs. putty-putty capital; national vs. regional)
- We provide several generic examples to enable reviewers to evaluate how model performs
- Paper forthcoming in JAERE evaluates series of industry-specific generic regulatory shocks and contains a wide array of sensitivity analyses using SAGE

Technical Accuracy and Defensibility

5. Each model run is subjected to a series of tests to verify that the solution represents an equilibrium. Additional tests are performed to verify that implicit parameters (e.g., labor supply elasticity) match their calibration targets. Are there other verification tests that should be incorporated into the model?
6. While the most appropriate approach for modeling a policy will be regulation specific, is the general framework for capturing compliance requirements in the model reasonable? Are there other approaches that should be incorporated into the model?

Technical Accuracy and Defensibility

- To help inform these questions, the model documentation:
 - Contains description of verification checks performed on the solution
 - Outlines two different approaches to modeling specific details of an environmental policy
- Reviewers may also find running the generic examples informative for answering these two questions

Model Versioning and Review of Updates

7. Is the outlined versioning framework transparent and reasonable? Do you have any specific suggestions for how to improve it?
8. Are the criteria in EPA's memo for the types of model changes that warrant subsequent peer review reasonable?

Model Versioning and Review of Updates

- To inform these questions, provide a short memo outlining:
 - Use of a version control system
 - EPA's approach to versioning major updates vs. data updates vs. bug fixes
 - How we intend to incorporate the rulemaking process (for instance, with one-off versions where the data and model used for the analysis are "frozen")
 - How versioning related to peer review
- We will have a separate presentation covering the versioning framework

Priorities for near-term improvements to SAGE modeling framework

9. Are the anticipated updates outlined in EPA's memo sensible next step improvements to the model and its parameterization?
10. Does the SAB recommend additional near-term updates to the SAGE modeling framework or parameterization?

Priorities for near-term improvements to SAGE modeling framework

- To aid in responding to these questions,
 - Model documentation lays out current state-of-the-art in the framework
 - Short memo outlines what we see as near-term priorities for updating framework
 - Why we think these issues are important to explore, including basic approach to incorporating them and how they fit with what others in literature have done
- We will briefly outline these priorities in SAGE model presentation