Analyzing Technology Policy under Uncertainty: Systems Approach in Aviation Modeling

Joosung Lee

KAIST Department of Business and Technology Management

jooslee@kaist.ac.kr

While models are often employed to analyze policy options, the lack of understanding of the uncertainties in them is an increasing concern of policy makers. For instance, radically different estimates that arise from large uncertainties in different computer models are fueling much of the global climate change debate. For local air quality regulations, computer models are frequently used. However, the uncertainties in these models have not been extensively quantified or considered for either global climate change or local air quality policies.

For policy makers, it is important to know how uncertain outcomes change with different policy options and if the outcomes can be distinguished given the uncertainties of the computer models used. Policy makers need to know where models disagree and the modeling assumptions that cause the differences. They also desire as small output variability as possible in order to ensure "robustness" of their policy design. Therefore, establishing and communicating model fidelity is an important task, which must parallel model development efforts. Identifying the uncertainty associated with model assumptions as modeling goes on is important because improving assumptions can improve model performance as well.

This paper focuses on treatment of model uncertainties that are most relevant to the models and scenarios. Assessments of both parametric and model uncertainties in the model are conducted. Various statistical techniques are employed to analyze uncertainties in a way that is most appropriate to communicating model fidelity and examining policy applications.