

## **Economy-wide Models in Integrated Assessment of Climate Policy**

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### ***Abstract***

Inter Government Panel on Climate Change 2007 and Stern Review Report 2006 have been successful in driving the message that drastic mitigation action is inevitable to achieve a stringent stabilisation level. The assessments show that emissions are required to decline early in 10-20 years time period if the CO<sub>2</sub>eq stabilization of 445-550 ppm is aimed at. Global annual GDP reduction is estimated in the range of less than 1.2% to attain the stabilization level. Both Bottom up and Top down models have been used to assess the mitigation potential. Bottom up models are used to understand how much best practice technology use in various economic sectors can reduce GHGs. Top down models are economy wide macro models. IPCC uses a whole range of Top down models to assess mitigation options and macro economic cost of mitigation. Most models use global least cost approach with universal emission trading, no transaction cost and perfect implementation of mitigation measures through out 21<sup>st</sup> century. Top down models are dominated by CGE models, core of which is input-output table. Non CGE top down models are also included in IPCC assessment. Stern Review is based on one Top down model.

Objective of this paper is to present a comprehensive review of the CGE models to highlight the strength and weakness of the model vis-a-vis other models in mitigation cost and potential assessments both in short and long run scenarios. Existing IA models originally emerged primarily from economic and energy modeling approaches that were for the most part developed for, and applied to, industrialized economies. Increasingly, however, these models have been enhanced and extended, to encompass the global economy at various levels of regional and sectoral disaggregation. The increasing emphasis on regionally and sectorally disaggregated global IA modeling reflects the emerging recognition of the global character of climate policy and the importance of developing countries in formulating policy, particularly following the Kyoto agreement and need for finding alternative post Kyoto regime.

The flexibility to model technological progress, energy trends, inclusion of developing country regions are some of the ongoing methodological issues. Added challenges are inclusion of synergies between adaptation and mitigation, developing-country-related parameters in terms of empirical foundation and technical rigor.

It will be useful to come up with an integrated database that explicitly accounts for climate sensitive sectors and environmental service flow and stock in input output framework at national level. Involvement of mainstream I-O modelers will be useful in making IA more competent to reduce uncertainty in generating estimates and economy wide policy impact analysis.

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