E3-INDIA MODEL
A USER'S PERSPECTIVE

Saket Sarraf, PhD.,
Principal, *ps* Collective

Aim

- Review E3-India model as a prospective user

- Notes
  - Model is still in development stage

Methodology

- Review based on
  - Model exploration
  - Response to written query
  - Available documentation
  - Follow up discussions

About E3-India

- Evaluate 'what-if' scenarios of the economy and energy at the state* and national level

- Notes:
  - *Currently state level applications are constrained to few states only due to data availability

Key findings

- Easy to use

- Rigorous modeling approach

- Reliable
  - modeling framework | data used | output

- The complexity of the algorithm is neatly screened from the end user, though available for detailed study for more advanced users

- Captures dynamic linkages between economic sectors, policy, demographics at multiple geographic scales

Use cases

- To **inform**
  - government on policies related to trade, natural resources, competitiveness of an industry, and on the environment

- To **evaluate**
  - impact of alternative policies on different sectors and segments of the society

- To **support**
  - Analysis, Debates, Deliberations

- To **educate and guide**
  - Students, Civil society, and Businesses

Use cases: Energy

- Understand **impacts of energy policy** on emissions, energy security, and the economy
  - carbon taxes
  - cap and trade systems
  - energy excise taxes
  - power sector price subsidies, and
  - feed-in-tariffs

Use cases: Pedagogy tool

- Students and Researchers
  - Understand, explore and follow through the impact of policies and choices
  - Construct and evaluate hypothetical what-if scenarios for pedagogy
  - Explore impact of various macro economic factors on the national and regional economy

Users

- Varied users
  - Policy makers
  - Professionals
  - Researchers
  - Businesses
  - Civil society
  - Students

Model framework

- Coupled input-output econometric approach

- Long history
  - RIMS II, REIM, REMI, E3ME, UK-MDME3

- Provides a much desired alternative to CGE

- Some Limitations

- *In my opinion, the E3ME framework is comparatively more transparent, less rigid, more versatile, and easy to use without sacrificing technical rigor*

Data and Calibration

- Data from public sources, well documented

- Runs are currently calibrated to India projections*

- Notes
  - *World Energy Outlook (IEA 2014, current policy scenarios)
  - Can be calibrated to other projections for national and state level

Scenario Analysis

- Simple policy scenarios can easily be defined using text based input to the browser based interface

- Complex scenarios can be evaluated with little extra understanding of underlying model logic and some coding experience.

- Tutorials are available to assist users in creating and evaluating these scenarios.

- Notes:
  - Tracing the impact of policy intervention sequentially
  - Distinguishing between direct, indirect and rebound effects
  - Important to understand the model linkages
  - Prior expectation before checking scenario results.
  - Building up scenario inputs (rather than putting all policies in one run)

Code and Installation

- Coded in FORTRAN

- Very light on computing resource needs

- Can be easily and quickly be installed on any personal computers running Windows

- No dependencies other than a modern web browser

- First runs just after a few clicks

Interface

- Browser based, minimalistic and intuitive interface, that
  o Provides access to documentation, assumptions, model inputs, scenarios, results and visualization
  o Allows to change assumptions, create scenarios, run model
  o Displays and visualizes model results
  o Compares different scenarios from within the same browser

- The visualization is fast, interactive & aesthetically pleasing
  o The results can be exported as CSV for further analysis and visualization

Documentation

- Well documented

- Ready access from within the tool interface

- Easy access to key assumptions like projected values of exogenous variable

- Notes
  - The accompanying manual to provide a more detailed documentation including description of the underlying theory and list of key assumptions
  - Documentation to include case studies to demonstrate the creation of some simple scenarios
  - E3-India model may also share historical data used for model calibration with users to enhance the credibility and transparency of the model

Currently known limitations

- Issues related to data and modelling of labour migration and interstate trade
  - The model is still a work in progress

- The inter-state dynamics is currently limited to few states due to lack of data

- Publically available data used to estimate model parameters often suffer from common issues like incompleteness, varying time-line and missing data

Role of user community

- Improve model credibility and usability through
  - o Data enhancement
  - o Flag unresolved/overlooked issues
  - o Refinement
  - o Case studies
  - o Generate and document variety of use cases
  - o Spread the word!

Suggestions

- Move towards open system
  - Collaborative development | Sharing data repository & sources

- Provide continuous support to new issues that are discovered as the user base increases

- Some additional visualization features like ability to export graphics, compare more than one variable on the same graph and customization will be helpful*

- The ability to manipulate the underlying model logic (e.g. switching on/off a set of equations) will help advanced users and researchers to debug, customize and model more complex policies than those envisioned by the developers early on in the product cycle

Conclusion

- The model delivers on most accounts as a policy analysis tool

- Simple, transparent, easy, fast and versatile to analyze many real life policy interventions

- With understanding of the economy and little training on the model, most users can generate and analyze useful policy scenarios within 2-3 days

- There are more complex models to evaluate policy decisions but they lack development and maintenance cycles, are closely guarded and provide negligible access to practitioners. The effort by the modeling team on this front is commendable in terms of bringing a complex model to the desktop of professionals and researchers alike

- The success of this model will strongly depend on continued collaborative work among model developers, funding agency, user groups and acceptance by policy makers

Final words!

- The model is continuously being updated and it is hoped that over time, some of the gaps will be addressed by a vibrant user community. The subsequent phase of model development is very promising and much needed. In the next few years the promoters should ensure continuous engagement of the model development team with the user community so that the true potential of the model is realized.