Why Linkage?

Denise Van Regemorter

CES KULeuven

Nice, ETSAP Workshop 17 December 2008

Possible Linkages

- **Full integration/linkage**: not many experience of full linkage, i.e. integration of a detailed macroeconomic model with a detailed partial equilibrium model but some experiences with simplified/detailed.
  - TIAM/GEMINI3: full linkage/integration
  - MARKAL-MACRO: a simplified macro part is added to the full energy model, it allows consistency between macroeconomic evolution and evolution in the energy system (e.g. saving will be consistent with the need of investment in the energy system
  - Technology modelling in general equilibrium models: experience with GEM-E3 with technology based modelling of the electricity sector
- The IAM models are fully integrated but then all parts are very simplified.

CENTER FOR ECONOMIC STUDIES

KATHOLIEKE UNIVERSITEIT LEUVEN

How linkage

- **From macro to partial**:
  - a consistent macroeconomic and sectoral evolution to generate the exogenous variables for the energy model
    - e.g. GEM-E3 for TIMES
  - **Change in trade pattern and thus of demand because of policy (experience from Maryse)**
    - **e.g. price effect on demand depending on relative price compared to world average**
- **From partial to macro**: energy module, associated with macroeconomic models,
  - A simplified energy model is added to the macro model,
  - Or the energy module is an aggregation of a specific energy model and indirectly linked to it.

Is Linkage needed?

- The different categories do not answer the same type of policy questions:
  - therefore linkage not necessaryly needed
- Important however
  - For macroeconomic models to integrate, though in a simplified way, the different possible responses of the energy system to the policy which is analysed.
  - For partial equilibrium models to integrate price mechanism to reflect partly the possible interaction outside the energy system.
  - To harmonize the two types of model to same type of behavioural or technological assumptions when used for joint policy analysis to ensure consistency
    - substitution elasticity of production function in macro model should reflect the technological substitution in energy model
- Examples of joint policy analysis
  - distributional issues between economic agents or countries are better addressed with macroeconomic models
  - technological opportunities, interaction between demand and supply in energy markets, better addressed with energy models

Conclusion

- The different categories of models have all their specificities.
  - The choice of which model to use will depend on the type of policy to be evaluated or the type of analysis to be made, on the regional coverage needed.
- Complementarities between the different types of models:
  - a consistent combination of models (not necessarily linked) can contribute to the evaluation of a policy in its various aspects:
- Technico-economic model: fully detailed for the choice of technology with sectoral disaggregation, explicit technological evolution overtime, direct cost within the energy system
- Macroeconomic model: analyses the feedback on the rest of the economy, distributional impact, differentiated impact by policy instrument