CGE Analysis of Environmental and Energy Policies

EAERE-FEEM-VIU Summer School

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LECTURE 1: *Combining Top-Down and Bottom-Up in Energy Policy Analysis*

We motivate the formulation of market equilibria as a mixed complementarity problem (MCP) in order to combine technological details of bottom-up energy system models and economic richness of top-down general equilibrium models within a single mathematical format. Our main objective lies in the explicit demonstration of how such an approach can be implemented for applied energy policy analysis. After laying out the algebraic MCP structure, we provide a stylized example of how to integrate bottom-up features into a top-down modeling framework. Finally we present generic applications to three themes that figure prominently on the energy policy agenda of many industrialized countries: nuclear phase-out, green quotas, and environmental tax reforms. The interested reader can download the computer programs for the worked examples from ftp://ftp.zew.de/pub/zew-docs/div/td-bu.pdf and further elaborate on the applied analysis.

References:

Böhringer, C. (1998), The Synthesis of Bottom-Up and Top-Down in Energy Policy Modeling, *Energy Economics* 20 (3), 233-248.

Böhringer, C., and T.F. Rutherford, Integrating Bottom-Up into Top-Down: A Mixed Complementarity Approach, ZEW Discussion Paper No. 05-28 (under revision: E*nergy Economics*).

LECTURE 2: *International Emissions Trading – The EU Experience*

Starting in 2005, the EU will implement a CO2 emissions trading scheme. We show that the outspoken objectives of economic efficiency and free allocation of allowances are incompatible with harmonized allocation rules. The latter would be necessary to avoid unequal changes of the financial positions between identical firms across the EU, thereby distorting competition, i.e. the “level playing field”. We discuss and evaluate potential adjustments to the current prescriptions of the EU emissions trading system in order to achieve harmonization of allowance allocation across EU Member States. The proposed adjustments involve relaxation of either the efficiency objective or the objective of free allowance allocation.

References:

Böhringer, C. and A. Lange (2005), Economic Implications of Alternative Allocation Schemes for Emission Allowances, *Scandinavian Journal of Economics* 107(3), 563–581.

Böhringer, C. and A. Lange (2005), Mission Impossible!? On the Harmonization of National Allocation Plans under the EU Emission Trading Directive, *Journal of Regulatory Economics* 27 (1), 81-94.