Model   Policy Analysis based on Computable Equilibrium

Model acronym   PACE

Contact persons

Christoph Böhringer
Centre for European Economic Research (ZEW)
L 7, 1
D-68161 Mannheim
+49 (0)621 1235-200
boehringer@zew.de

Andreas Löschel,
Centre for European Economic Research (ZEW)
L 7, 1
D-68161 Mannheim
+49 (0)621 1235-186
loeschel@zew.de

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Degree of exogeneity

Which are the main driving exogenous variables of the model?

The main exogenous variables of the model are:

- substitution elasticities in production and consumption

- population growth

- overall productivity growth

- energy efficiency improvements

Welfare and consumption

Which measures of welfare are used? Are measures of welfare in particular related to consumption?

The welfare measure used is the present value of lifetime utility from consumption of man-made goods.

Stocks and Flows

Which are the main stock variables in the model? How do they interact with corresponding flows? Does the model include mechanisms for substituting flows by stocks?

Labor and capital are stock variables in the model. The evolution of labor over time is exogenous. Total output per period is either consumed (incl. intermediate demand and exports) or invested. Capital stocks evolve through depreciation and new investment. The optimal level of consumption and investment over time result from the maximization of the present value of lifetime utility by the representative consumer.

Production of commodities in each region is captured by production functions which characterize technologies through substitution possibilities between capital, labor (stocks), energy and non-energy intermediate inputs, i.e. material (flows).

Technical change

What types of technical change are applied to which variables of the model?

Technical change occurs through price-induced factor substitution, exogenous productivity growth and autonomous energy efficiency improvements.

Labor market

Which assumptions determine the characteristics of the labor market of the model?

Labor (and capital) is intersectorally mobile within a region but cannot move between regions. Labor supply is fully inelastic and increases at an exogenous growth rate. Labor markets are perfectly competitive.

Tax recycling

Which assumptions are made as to the use of carbon taxes in the model? How, in particular, are these tax revenues recycled?

Revenues from carbon taxes are recycled lump-sum to the representative agent.

Energy prices

Which assumptions are made about energy prices? To what extent are energy prices exogenous?

Energy prices are endogenous determined by the associated market clearance conditions for the energy markets.

Renewables, carbon sequestration

To what extent are renewables and carbon sequestration explicitly or implicitly considered?

There are carbon-free backstop technologies in the model.

Cost and benefit concepts

How do you define abatement costs? What costs of climate policy can the model deliver? How are they defined? How are benefits of climate policy taken into account and can they be quantified?

Carbon policies are introduced via an additional constraint that holds carbon emissions to a specified limit. The solution of the model gives a shadow value of carbon associated with this carbon constraint which equals the marginal cost of reduction; it indicates the incremental cost of reducing carbon at the carbon constraint. Welfare changes that arise from carbon constraints are measured by Hicksian equivalent variation in discounted lifetime income.

Benefits from climate policy are not taken into account.