

Intertemporal General Equilibrium Model

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General Information

Model Abbreviated Name: **IGEM**

Model Extended Name: **Intertemporal General Equilibrium Model**

Model Overview/Abstract:

The Intertemporal General Equilibrium Model (IGEM) is a dynamic model of the U.S. economy which describes growth due to capital accumulation, technical change and population change. It is a multi-sector model that tracks changes in the composition of industry output, as well as changes in input mix used by each industry, including energy use. It also depicts changes in consumption patterns due to demographic changes, price and income effects

Keywords:

Model Technical Contact Information:

Model Homepage: <http://www.igem.insightworks.com/docs/>

User Information

Technical Requirements

Computer Hardware

This model runs on a desktop computer (PC).

Compatible Operating Systems

Windows

Download Information

The documentation is available at: <http://www.igem.insightworks.com/docs/190.html>

Using the Model

Basic Model Inputs

Model input data available at: <http://www.igem.insightworks.com/docs/264.html> Three principal sources of data are used: the benchmark input-output transactions tables produced by the Bureau of Economic Analysis; the annual National Income and Product Accounts statistics; and the industry output data set prepared by the Bureau of Labor Statistics.

Basic Model Outputs

The IGEM depicts changes in consumption patterns due to demographic changes, price and income effects. The model is designed to simulate the effects of policy changes, external shocks and demographic changes on the prices, production and consumption of energy, and the emissions of pollutants.

User Support

User's Guide Available?

<http://www.igem.insightworks.com/docs/189.html>

Model Science

Problem Identification

The Intertemporal General Equilibrium Model (IGEM) is a dynamic model of the U.S. economy which describes growth due to capital accumulation, technical change and population change. It is a multi-sector model that tracks changes in the composition of industry output, as well as changes in input mix used by each industry, including energy use. It also depicts changes in consumption patterns due to demographic changes, price and income effects.

The main driver of economic growth in this model is capital accumulation and technological change. Capital accumulation arises from savings of a household that is modeled as an economic actor with “perfect foresight.” Aggregate household consumption and savings are chosen to maximize a utility function that is a discounted sum of the stream of future consumption. Within each period, the consumption – or demand – side of the model is driven by a detailed model of household demand that includes demographic characteristics.

The production – or supply – side of the model characterizes the industrial structure in detail. 35 industries are identified, of which 21 are manufacturing and 5 are energy related, these are listed in Table 1. Each industry produces output using capital, labor, energy and non-energy intermediate inputs using constant returns to scale technology. The production technology used changes over time due to both exogenously specified changes and endogenous changes from price effects. Coal, refined oil and gas are separately identified energy inputs. The output from domestic industries is supplemented by imports from the rest of the world to form the total supply of each commodity.

Summary of Model Structure and Methods

This model is implemented econometrically, by which is meant that the parameters governing the behavior of producers and consumers are statistically estimated over a time series dataset that is constructed specifically for this purpose. This is in contrast to many other multi-sector models that are calibrated to the economy of one particular year. These data are based on a system of national accounts developed by Jorgenson (1980) that integrates the capital accounts with the National Income Accounts. These capital accounts include an equation linking the price of investment goods to the stream of future rental flows, a link that is essential to modeling the dynamics of growth.

Model Evaluation

A partial list of publications and reports using IGEM can be found at:
<http://www.igem.insightworks.com/papers/>

EPA use of ADAGE and IGEM for economy-wide modeling has been the subject of independent peer review. See: <http://www.epa.gov/climatechange/economics/economywidepeerreview.html>