Applied Dynamic Analysis of the Global Economy (ADAGE)

Last Revision Date: 01/16/2014

General Information

Model Abbreviated Name: **ADAGE**

Model Extended Name: **Applied Dynamic Analysis of the Global Economy (ADAGE)**

Model Overview/Abstract:

ADAGE is a dynamic computable general equilibrium (CGE) model capable of examining many types of economic, energy, environmental, climate change mitigation, and trade policies at the international, national, U.S. regional, and U.S. state levels. To investigate proposed policy effects, the CGE model combines a consistent theoretical structure with economic data covering all interactions among businesses and households.

ADAGE has three distinct modules: International, US Regional, and Single Country. Each module relies on different data sources and has a different geographic scope, but all have the same theoretical structure which allows for detailed regional and state-level results that incorporate international impacts of policies. The model is developed and run by RTI International for EPA.

Keywords: Computable General Equilibrium, CGE, Energy, Climate, Greenhouse Gases

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Model Homepage: http://www.rti.org/page.cfm?objectid=DDC06637-7973-4B0F-AC46B3C69E09ADA9

User Information

Technical Requirements

Computer Hardware
This model runs on a desktop (PC) computer.

Compatible Operating Systems
MS-DOS

Download Information

The documentation is available for download at: http://www.rti.org/pubs/ema-model-doc_ross_apr08.pdf

Using the Model

Basic Model Inputs
Economic data in ADAGE come from the GTAP and IMPLAN databases, and energy data and various growth forecasts come from the International Energy Agency and Energy Information Administration of the U.S. Department of Energy.

Basic Model Outputs
The ADAGE results include, among others, estimates of the following:

- Hicksian equivalent variation (a metric used in economic analyses to Describe overall policy effects, considering all impacts of changes in prices, income, and labor supply);
- gross domestic product (GDP), consumption, industry output, and changes In prices;
- employment impacts and changes in wage rates;
- capital earnings and real interest rates;
- investment decisions;
- input purchases and changes in production technologies of firms;
- flows of traded goods among regions;
- energy production and consumption by businesses and households; and
- fuel and GHG permit prices.

Model Science

Problem Identification
The ADAGE model can be used to investigate climate-change mitigation policy issues affecting six types of greenhouse gases (GHG) at a range of geographic scales. To investigate implications of policies, the ADAGE model combines a consistent theoretical structure with observed economic data covering all interactions among businesses and households. These economic linkages include firms purchasing material inputs from other businesses and factors of production (labor, capital, and natural resources) from households to produce goods, households receiving income from factor sales and buying goods from firms, and trade flows among regions. Nested constant-elasticity-of substitution (CES) equations are used to characterize firm and household behaviors (which are intended to maximize profits and welfare, respectively), as well as options for technological improvements. ADAGE uses a classical Arrow-Debreu general equilibrium framework to describe these features of the economy. Households are assumed to have perfect foresight and maximize their welfare (received from consumption of goods and leisure time) subject to budget constraints across all years in the model horizon, while firms maximize profits subject to technology constraints.

Summary of Model Structure and Methods
ADAGE is a dynamic computable general equilibrium (CGE) model capable of examining many types of economic, energy, environmental, climate- change mitigation, and trade policies at the international, national, U.S. regional, and U.S. state levels. To investigate policy effects, the CGE model combines a consistent theoretical structure with economic data covering all interactions among businesses and households. A classical Arrow-Debreu general equilibrium framework is used to describe economic behaviors of these agents. Households are assumed to have perfect foresight and maximize their welfare (received from consumption of goods and leisure time) subject to budget constraints across all years in the model horizon, while firms maximize profits subject to technology constraints. Economic data in ADAGE come from the GTAP2 and IMPLAN3 databases, and energy data and various growth forecasts come from the International Energy Agency (IEA) and Energy Information Administration (EIA) of the U.S. Department of Energy.

Model Evaluation
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