Glossary

Activity is the domestic production of a good or service.

Agents include industries, factors of production (e.g., labor and capital), household consumers, the government, and the rest-of-world region, which supplies imports and demands exports.

Ad valorem tax is a tax levied as a percentage of value.

Backward linkage index is the sum of the input-output coefficients for all intermediate goods *i* used in industry *j*. It describes an industry's intensity in the use of intermediate inputs from upstream suppliers.

Behavioral equation see equation, behavioral.

Budget constraint is the amount of income received by an agent that is then allocated to consumption, savings and taxes.

Budget share is the value share of each good or service in total expenditure.

Calibration is a procedure that calculates the shift and share parameters used in the production and utility functions in the CGE model so that the solution to each model equation replicates the initial equilibrium as reported in the base data.

cif see cost, insurance, freight.

Circular flow of income and spending describes transactions in an economy: Firms buy inputs and pay wages and capital rents to factors used in the production of goods and services. Firm payments to factors are the income earned by households and spent on goods and services, government taxes, and savings. Taxes and savings lead to government and investment demand. Firms respond to demand by buying inputs and hiring labor and capital.

Closure defines whether a variable is endogenous or exogenous.

Commodity is a composite input or consumption good, composed of domestically produced and imported varieties; and, in some CGE models, it is a composite production good, composed of varieties produced for domestic and export sales.

Complements are inputs or consumption goods that are used together, so that a rise in the price of one input or good causes demand for the other to fall.

Computable general equilibrium (CGE) model describes an economy as a whole, and the interactions among its parts. It is solved to find the set of prices at which supply and demand is in equilibrium in all markets.

Consumer price is the price paid by consumers. It is the domestic producer price plus sales tax, or bilateral *cif* import price plus import tariff and sales tax

Cost-insurance-freight (*cif*) is the price of a good, including the trade and transportation margins service incurred in its international trade.

Deadweight loss is the loss in producer and consumer surplus that is not recouped by the government as tax revenue.

Deterministic CGE model provides unique solution values for each variable, given model equations, parameters, and base data.

Direct burden is the amount of tax paid to the government.

Direct tax is a tax that is levied on factors or individuals and whose burden cannot be passed on to other agents.

Downstream industries are the production activities that use the output of other, "upstream" industries as intermediate inputs into their production process.

Dutch Disease describes the deindustrialization of an economy when an increase in the world price of a natural resource export price leads to an expansion of the booming resource sector, higher incomes and spending, and real exchange rate appreciation.

Dynamic CGE model describes a country's long run growth path, with capital accumulation, and productivity growth.

Effective factor price is the wage or rental paid per unit of effective labor or capital.

Elasticity is an exogenous parameter in a CGE model that describes the responsiveness of supply or demand to a change in prices or income.

Elasticity, aggregate input substitution (σ_{AGG}) in the production of good *i* describes the percent change in the ratio of the value-added bundle to the intermediate input bundle in the final product, given a percent change in their inverse price ratio, holding final output constant.

Elasticity, cross-price describes the percent change in quantity demanded of commodity *i* demanded given a percent change in the price of commodity *j*.

Elasticity, export demand for commodity *i* describes the percent change in a country's world market share given a percent change in the ratio of the average global price to its *fob* export price.

Elasticity, export transformation (σ_E) in production of good *i* describes the percent change in the quantity ratio of exports to domestic sales given a percent change in the ratio of the domestic sales price to the *fob* world export price, holding output of *i* constant.

Elasticity, factor mobility (σ_F) for factor *f* describes the percent change in an industry's quantity share in total employment of a factor given a percent change in the ratio of the economywide average factor price to the industry's wage or rent.

Elasticity, factor substitution (σ_{VA}) for industry *i*, describes the percent change in the quantity ratio of a factor to total factor inputs given a percent change in the inverse ratio of the factor's price relative to the prices of other factors, holding the value-added bundle constant.

Elasticity, import substitution (Armington) (σ_M) for commodity *i* describes the percent change in the quantity ratio of imported to domestic varieties given a percent change in their inverse price ratio, holding consumption of *i* constant.

Elasticity, income for commodity *i* describes the percent change in quantity demanded given a percent change in income.

Elasticity, intermediate input substitution (σ_{INT}) for industry *i* describes the percent change in the quantity ratios of intermediate inputs given a percentage change in the inverse ratio of input prices, holding output of *i* constant.

Elasticity, own price for commodity *i* describes the percent change in quantity demanded given a percent change in its price.

Elasticity, substitution in consumption (σ_C) between commodities *i* and *j* describes the percent change in the quantity ratios in a given consumer basket, relative to a percent change in their inverse price ratio.

Endogenous variable has a value that is determined as the solution of a model equation.

Equation, behavioral describes the economic behavior of producers or consumers based on microeconomic theory.

Equation, identity defines a variable as a mathematical function (sum, product, etc.) of other variables. Closure rules specify which variable adjusts to maintain the identity.

Equilibrium occurs when the quantities of supply and demand are in balance at some set of prices.

Equivalent variation see welfare, equivalent variation.

Excess burden is the loss in economic efficiency when producers and consumers change the quantities that they produce or consume to avoid a tax.

Exchange rate, nominal measures the rate at which currencies are be exchanged for one another.

Exchange rate, real measures the relative price of traded to nontraded goods.

Exogenous parameters in a CGE model are tax and tariff rates, elasticities of supply and demand, and the calibrated shift and share coefficients used in supply and demand equations.

Exogenous variable is a variable whose value is taken as given and does not change when model equations are solved.

Factor is a primary productive resource, such as land, labor, or capital, that is combined with intermediate inputs to produce goods and services.

Factor endowments are the stocks of labor, capital, and other primary factors that constitute the productive resource base of an economy.

Factor endowment, effective is the stock of a factor that takes into account both the quantity and the efficiency of a factor.

Factor, immobile (sector-specific) does not move from the production activity in which it is originally employed, regardless of differences in relative wages or rents across production activities.

Factor intensity is measured by the relative size of factors' input-output coefficients. The comparison of coefficients can be made across factors within a production activity, or by comparing a factor's coefficient across industries or countries. An activity is intensive in a factor if the coefficient for that factor is higher than for other factors, higher for that factor compared to other

activities, or higher for that factor compared to the same activity in other countries.

Factor, mobile moves across production activities within a country in response to changes in relative wages and rents, until wages and rents are equalized.

Factor mobility describes the ease with which labor, capital, and other factors can move to new employment within a country when wages and rents differ across production activities.

Factor, partially mobile is a factor for which transition costs are important enough to discourage it from changing its employment unless pay differences across industries are sufficient.

Factor price is the wage or rent paid to a factor by the production activity that employs it.

Factor price, effective is the wage or rent paid per unit of effective factor quantity.

Factor productivity describes the level of output per unit of factor input.

Factor unemployment describes factors that are not employed by any production activity and are not counted as part of the productive capacity of an economy.

Factors, complementary describe factors for which an increase (decrease) in the use of one factor in the production process requires an increase (decrease) in use of the other.

Factors, substitute describe factors that can replace one another in the production of a good or service.

Final demand is the demand for goods and services in their end-use; they are not further combined or processed into other goods and services.

Flow is the change in quantity of a stock over a period of time.

fob see free on board.

Forward linkage index is the share of sales used as intermediates inputs in an industry's total sales. It describes an industry's role in providing inputs for downstream industries.

Free-on-board (*fob*) is the value of the export good, including export taxes but excluding the *cif* costs paid by the importer.

Gross complement Two goods are gross complements if a decline in the price of one good causes the quantity demanded of the second good to rise.

Gross Domestic Product (GDP) from the income side reports the sources of total national income from the wages and rents earned by factors of production, taxes on economic activity, and depreciation.

Gross Domestic Product (GDP) from the expenditure side reports the allocation of national income across four categories of spending: private consumption (C), investment demand (I), government demand (G), and net exports (E-M).

Gross substitute Two goods are gross substitutes if a decline in the price of one good causes the quantity demanded of the second good to fall.

Gross value of output of a production activity is the sum of value-added plus the cost of intermediate inputs. It is the market value of industry output and reported as the sum total of the activity column in the SAM.

Hecksher-Ohlin theorem posits that countries will export goods that are intensive in the factors of production that are in relatively abundant supply, and import goods that are intensive in the factors of production that are in relatively scarce supply.

Homothetic utility function assumes an income elasticity of demand of one so that the percentage change in quantity demanded is the same as the percentage change in income.

Identity equation, see equation, identity.

Immobile factor (sector-specific) is a factor that remains fixed in its original sector of employment.

Import (Armington) aggregation function describes how imported and domestic varieties are combined to produce a commodity.

Independent goods or factors are items for which demand does not change when the prices of other goods or factors change. Their cross-price elasticity of demand is zero.

Indifference curve describes all possible combinations of commodities that yield the same level of utility or satisfaction to the consumer.

Inferior good is a good for which demand declines as income grows.

Input intensity is measured by the relative size of intermediate input-output coefficients. The comparison of coefficients can be made across intermediate inputs within a production activity, or by comparing an input's coefficient

across industries or countries. An activity is intensive in an intermediate input if its input-output coefficient for that input is higher than for other intermediate inputs, higher for that input compared to other production activities, or higher for that input compared to the same activity in other countries.

Input-output coefficient describes the ratio of an intermediate or factor input per unit of output.

Input-output coefficient matrix displays the input-output coefficients of all inputs in every production activity. The matrix shows how industries are linked through their demand for intermediate inputs.

Intermediate input is a good that is combined with other inputs and factors to produce a final product.

Isocost describes all combinations of inputs that can be purchased for the same cost.

Isoquant describes all technologically feasible combinations of inputs that can be used to produce the same level of output.

Isorevenue line shows all combinations of outputs that generate the same amount of revenue for the producer.

Large country's world prices for its imports and exports are influenced by its export and import quantities.

Law of Demand states that demand for a good will rise (fall) when its price falls (rises).

Leontief fixed-proportions production function assumes that all inputs must be used in fixed proportions, to output.

Long run is a postshock adjustment period that is sufficiently long that factors are fully mobile across production activities, and factor endowments and factor productivity may change.

Luxury good has an income elasticity of demand that is greater than one.

Macro-micro model provides the endogenous, macroeconomic results from a CGE model (the macro model) as the exogenous inputs into a microeconomic model with large numbers of households or firms.

Marginal rate of substitution is the rate at which the consumer is willing to trade off one good for one unit of the other good.

Marginal product is the addition to output from an additional unit of an input, holding other inputs constant.

Marginal welfare burden is the change in national welfare due to a very small – a marginal – change in an existing tax.

Medium run is a postshock adjustment period sufficiently long that factors are fully mobile across production activities, but too short for long-run changes in factor accumulation or productivity to take place.

Model closure is the modeler's decision as to which variables are exogenous and which are endogenous.

Multicountry model contains two or more countries (or regions) whose economies and economic behavior are described in detail and which are linked through trade and, sometimes, capital and labor flows.

Necessity good has an income elasticity of demand that is less than one.

Nested production function, see production function, nested.

Net substitute Two goods are net substitutes if a decline (rise) in the price of X relative to Y causes an increase (decrease) in the quantity ratio of X toY, holding output or utility constant.

Nonhomothetic utility function assumes the income elasticity of demand does not equal one so that the percentage change in quantity demanded changes by less than (the income elasticity is less than one) or more than (the income elasticity exceeds one) the percentage change in income.

Normal good has a positive income elasticity of demand. Demand for a normal good increases when income rises.

Numeraire is a price that is fixed at its base value and serves as the standard of value against which all other prices in the model can be measured.

Output effect is the change in demand for all inputs by the same proportion as the change in output, holding input price ratios constant.

Parameters in a CGE model include elasticity parameters, calibrated shift and share parameters used in production and consumption functions, and calculated tax rates.

Partial equilibrium model is a system of mathematical equations that describe the economic motives and behaviors in the market for one good, or of one type of economic agent, such as consumers, holding prices and quantities in the rest of the economy constant.

Price, bilateral *(fob)* export for good i is the exporter's *fob* price to each export market; it includes the export tax.

Price, bilateral *(cif)* import for good *i* is the exporter's bilateral export price plus *cif* costs; it excludes the import tariff.

Price, consumer for good *i* is the producer price plus consumer sales tax for domestic varieties, and the *cif* import price plus import tariffs and consumer sales taxes for imported varieties.

Price, global for good *i* is the trade-weighted sum of the bilateral *fob* prices of all exporters.

Price, producer for good *i* is the producer's sales price; in a competitive market, it is equal to the costs of production and inclusive of production taxes and subsidies.

Price, world export for an exporter's sale of commodity *i* is the trade-weighted sum of its bilateral *fob* export prices.

Price, world import for an importer's purchase of commodity *i* is the trade-weighted sum of its bilateral *cif* import prices.

Product transformation curve plots all possible combinations of two goods that can be produced with a given quantity of productive resources.

Production function defines the technology, or physical production process, by which intermediate inputs are transformed by machinery and workers into a product.

Production function, nested separates the production process into smaller production processes that are "nested" within the larger process of producing the final product. Each nest has its own production function.

Quasi-homothetic preferences describe fixed minimum consumption requirements and homothetic preferences for discretionary consumption goods.

Rational expectations describe producers and consumers who anticipate and take into account prices and income in all time periods as they make their current decisions.

Real exchange rate, see exchange rate, real.

Regional household is a macroeconomic account that aggregates total national income from factor earnings and taxes, and allocates the income to private consumption, government, and savings.

Rybczynki theorem posits that an increase in the quantity of one factor will lead to an absolute increase in the production of the good that uses that

factor intensively, and an absolute decrease in production of the good that does not use it intensively, holding world prices constant.

Second-best is the most efficient outcome attainable if there is an existing distortion in another market due to a tax, a market failure, or other type of economic constraint.

Sector-specific factor (see immobile factor).

Sets are the domains over which parameters, variables, and equations are defined.

Short run equilibrium describes a postshock adjustment period that is short enough that at least one factor of production, usually capital, remains immobile, and no long-term changes in factor endowments or productivity occur.

Single-country model describes only one country in detail and summarizes the rest-of-world economy.

Small country's world prices for its imports and exports are determined by world price levels and are independent of its export and import quantities.

Social Accounting Matrix is a square matrix whose columns and rows describe transactions among buyers and sellers in the circular flow of income and spending in an economy in a time period.

Static model describes an economy's equilibria before and after a shock, holding factor supplies constant, and does not depict the adjustment path.

Stochastic CGE model accounts for randomness in the economy and solves for the mean values and probability distributions of the endogenous variables.

Stock is the available quantity of a factor at a point in time.

Stolper-Samuelson theorem posits that an increase in the world price of a good leads to a rise in the price of the factor used intensively in its production, and a decline in the price of the other factor.

Structure refers to the economy's industrial composition, the commodity composition of demand and trade, shares of each factor in employment and earnings, and relative tax rates.

Structure table uses the microeconomic data in the SAM to describe the economy in terms of shares (e.g., shares of each commodity in households' consumption) and rates (e.g., import tariff rates or income tax rates).

Substitute goods or factors are items for which the producer or consumer is willing to trade-off more of one for less of the other as their relative prices change.

Substitution effect is the change in the ratio of inputs in production or in consumption as relative prices change, at constant output or utility levels.

Tax, *ad valorem* is levied as a percentage of the value of goods or services.

Tax, direct is levied on factors or individuals; its direct burden cannot be shifted to other agents.

Tax, export is levied on exports.

Tax, factor use is levied on producers based on their employment of factors of production.

Tax incidence describes how the direct burden of indirect taxes is shared among buyers and sellers after prices and quantities adjust.

Tax, income is a direct tax paid by factors or households on the basis of income earned.

Tax, indirect is levied on the production or purchase of goods or factors; its direct burden can be shifted from the entity that pays the tax onto someone else through a change in price of the good or factor.

Tax, lump sum is a fixed tax liability that does not depend on income, wealth, or level of consumption or production.

Tax, output is levied on producers based on their output.

Tax, sales is levied on purchases of goods and services used as intermediate inputs or in final demand.

Tax, specific is levied per quantity unit.

Tax structure table expresses tax flow data in the SAM as tax rates.

Technology tree (see nested production function).

Terms of trade is the ratio of the world (*fob*) price of a country's export good(s) relative to the *fob* price of its import good(s).

Total factor productivity (TFP) is the output level per unit of aggregate factor input.

Trade margins are the insurance, and freight charges incurred when goods are shipped by air, sea, or overland from the exporting country to the importing country.

Upstream industries are the production activities that produce goods that are used as intermediate inputs into other, "downstream" industries.

Utility function describes how commodities can be combined, according to the tastes and preferences of consumers, to generate consumer utility or satisfaction.

Value-added includes factor input costs and tax payments by activities in the production of goods and services.

Value-added production function describes the stage of the production process in which producers choose the most efficient ratios of factors in the value-added bundle.

Welfare, equivalent variation is a money-metric measure of the value to the consumer of the price changes due to a shock. It is calculated as the difference in income required to achieve the new versus the initial levels of utility when goods are valued at base year prices.

Welfare, real consumption is a money-metric measure of the value to the consumer of the price changes due to a shock. It is calculated as the difference in income required to buy the new basket of goods versus the initial basket of goods when both baskets are valued at base year prices.

World *cif* import price for good *i* is the trade-weighed sum of the bilateral *cif* import prices of commodities imported by destination country s from source country *r*. The price includes trade margins but excludes import tariffs in country s.

World *fob* export price for good *i* is the trade-weighed sum of the bilateral *fob* prices of commodities exported from source country *r* to destination country *s*. The price includes export taxes in country *r* but excludes trade margins costs.