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Agricultural and Other Economic Models of the Economics and Statistics Service

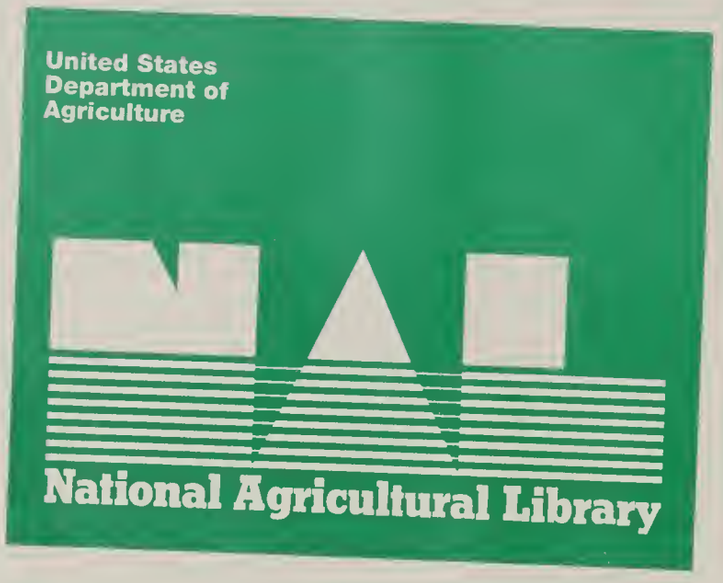
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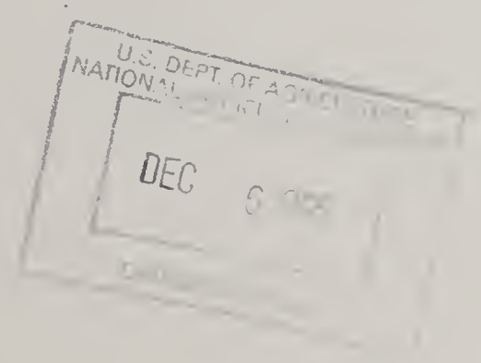
Table of Contents

	Page
Introduction	1
Integrated Agricultural Sector Models	2
Macroeconomic and Other Nonagricultural Models	14
Commodity/Sub-Sector Specific Agricultural Models	24
Domestic	25
Livestock	26
Crops	39
Retail Demand and Food Price	49
Farm Income and Cost of Production	55
International	64
Single Country	65
Multi - Country	81



This document contains a series of briefing sheets on current modeling activity in ESS. It was compiled for an administrative briefing on this topic. The breath of modeling activity ongoing within ESS was felt to be of sufficiently broad interest to warrant publication of the briefing sheets.

The larger comprehensive models are presented first under the heading of Integrated Agricultural Sector Models. A set of Macroeconomic and Other Nonagricultural Models are described next. Finally a variety of more narrowly focused domestic and international agricultural sector and related models are reviewed.

The briefing sheets are arranged in alphabetical order by model name within each major section. The sheets present a synopsis of each model (description, applications, and costs) and indicate the appropriate contact person with organizational affiliation and phone number.

This document was compiled by the Food and Agricultural Policy Branch, NED/ESS.

Integrated Agricultural Sector Models

Model Name: A General Equilibrium Model of Agriculture as Part of the U.S National Economy - GEM

Responsible Person(s): Dean Hughes 447-7340
Inputs and Finance Branch, NED

Model Description:

GEM is a nonlinear, dynamic, positive, annual macroeconomic model of the U.S. economy. It uses a portfolio balance approach to modeling the behavior of all sectors (farm operator families, other domestic consumers, nonfarm production units, financial intermediaries, government and the rest of the world) of the economy. The model contains 148 simultaneously solved equations and is driven by assumptions regarding 46 exogenous variables. The exogenous variables can be broken up into 4 groups; (1) monetary policy variables, (2) fiscal policy variables, (3) farm policy variables, and (4) others (including population, industrial production indices for foreign countries, price of imported fuel, variations in domestic weather, etc.). Output from GEM includes; (1) a list of macroeconomic variables including GNP, real GNP, GNP deflator, CPI food, CPI nonfood-nondurables and interest rates), (2) the line items of the balance sheet of the farming sector, (3) the line items of farm income statistics, (4) the cash sources and uses of funds statement for the farming sector, (5) a personal income and outlay account for farm operator families, and (6) a capital finance account for farm operator families.

Model Applications:

Over the last year GEM has been used to provide input to the finance speech at the outlook conference, forecasts of real estate values, farm debt interest rate and interest expenses for the Agricultural Finance Outlook publication and periodic updates of the baseline, and GEM has been used to provide forecasts of farm credit needs through 1990 for the National Agricultural Credit Study.

Operating and Updating Costs:

Cost per run: $15

Annual maintenance cost: $1000.

Model Name: Chase Econometrics Agricultural Model

Responsible Person(s): Ken Gadson 447-7330
Food and Agricultural Policy Branch, NED

Model Description:

The Chase Econometrics Agricultural Model is a quarterly model and consists of approximately 350 equations. The model, in addition to predicting commodity prices, production, and consumption, contains components to estimate the wholesale and consumer price indices for farm products, prices received and paid by farmers, and net farm income. Endogenous crops sector variables include acreage planted and harvested, domestic disappearance, feed utilization, farm and wholesale price, and commercial stocks. Imports, exports, farmer-owned reserve stocks, yields and seed utilization are treated as exogenous.

Model Applications:

The Chase Econometrics Agriculture data base and model provides data and forecasts for supply, demand and prices of major crop and livestock commodities and farm income. The model can be used to analyze changes in loan rates, target prices, set-aside, participation, and grain reserve programs on crop and livestock prices and production, net farm income and consumer food prices.

In addition, policy simulations via the macroeconomy can be analyzed since the model can be linked to Chase's Macroeconomic Model.

Operating and Updating Costs:

Cost per run: $25-$30

Annual maintenance cost: None

Model Name: Food and Agricultural Policy Analysis System

Responsible Person(s): Larry Salathe, Michael Price, Kenneth Gadson 447-7330
Food and Agriculture Policy Branch, NED

Model Description:

The Food and Agricultural Policy Analysis System (FAPAS) is an annual econometric model of the U.S. food and agricultural sector. The model is designed to generate detailed supply and utilization tables for beef, pork, dairy, chickens, turkeys and eggs on the livestock side, and for wheat, corn, grain sorghum, barley, oats and soybeans on the crops side. FAPAS also estimates farm expenses, receipts from marketings, consumer price indices associated with food products, and government payments to farmers.

Model Applications:

The model may be used for both forecasting and policy analysis. FAPAS is capable of analyzing the impacts of changes in loan rates and target prices, set-aside and diversion programs, and exogenous shifts in supply or demand for food products. In addition, the model may also be used to examine the effects of price support operations on the dairy sector. Since the model is solved simultaneously, FAPAS provides a framework for analyzing the impact of a policy directed toward a specific sector of agriculture, and how it will effect all other sectors included in the model.

Operating and Updating Cost:

Cost per run: $20

Annual maintenance cost: $5,000

Model Name: ISU/NRE LP-Econometric-I/O System

Responsible Person: Wen-yuan Huang, Resource Systems Branch, NRE
FTS 865-4422

Model Description:

This system of models combines the Hybrid with regional input/output models. It, therefore, comprises a recursive system of linked regional LP national. Econometric simulation (EM) and regional I/Os. The LP component may be either a cost minimization or a profit maximization routine, with regional detail based on the same producing areas and production activities found in that model. The EM component in planned applications will be FAPAS or a similar version. A data base for the input/output component is being developed to be added to the existing LP and EM file. Regional boundaries in this system will be flexible to be determined by the scope and depth of coverage needed in specific applications. Reporting of regional solution results can be also be flexible, based on the level of detail and/or degree of geographic aggregation desirable. This system permits examination of economic scenarios and policy/program/project options in terms of production, income, resource use, employment and other secondary effects.

Model Applications:

A preliminary version has been applied to Iowa. The complete system will be applied initially to comprehensive land and water studies in the Great Plains. Model specifications and data needs are now being identified. Output will involve a wide range of resource use and agricultural characteristics including ground water depletion, soil/water conservation, pest management, fertilizer use, energy use and production, land use, regional competition and demand side economic scenarios. Other regional applications will follow as programming for the Great Plans proceeds. The System has implications for trade questions and IIASA is using this basic structure in a pilot study with applications of this method in its worldwide research program.

Operating and Updating Costs:

Costs per run: Costs depend on number of regions analyzed, their size, and the number of time periods. A one state, one year run will cost less than $20.

Annual maintenance cost: Annual costs will be shared by ISU, NRE, SCS in varying proportions depending upon the interests of each agency in a particular analysis. NRE fixed cost is estimated at 1 SPY.

Model Name: ISU/NRE LP/Econometric Models (Hybrid)

Responsible Person(s): Wen-yuan Huang, Resource Systems Branch, NRE
FTS 865-4422

Model Description:

This analytical system recursively links a national econometric simulation model and an interregional programming model. The system can be used to trace through the policy impacts on regional production and resource use as well as the impacts of conservation and resource constraints on national/regional capacity, price and income. The linear programming component is a version of the ISU/NRE LP Model. Two simulation models have been utilized--the ESS Cross Commodity Model with 127 exogenous and 164 endogenous variables, and a national simulation model developed at ISU. Other simulation models may be substituted for example NIRAP or FAPAS, at the option of the user; similarly, the user retains the choice over the version of LP to use.

The hybrid model generates a dynamic sequence of estimates on a yearly basis for as many years as the user desires, with the simulation for each year based in part on information passed from the preceeding year. The hybrid model generates information on the spatial pattern of supply, resource use, and the technical structure of production from the linear programming model for each year of the sequence. Yearly information on market processes, and prices is provided by the econometric model. The linear programming component validates the estimates of the econometric component and adjusts those estimates if they exceed the physical capacity of the agricultural sector in any particular year.

Model Applications:

Applications of the hybrid models have involved: estimation of regional production patterns and production activities (output from the L-P) from given national commodity demands (projected by the econometric model), estimation of national policy impacts on potential regional production and resulting market affects (prices & quantities), and identification of efficient regional production plans given alternative national policies and market scenarios.

Information generated is reported by sub-regions, regions, and/or at the national level for basic parameters such as prices, farm income, resource use, environmental residues and other items specified by the user. The time frame covered can also be specified by the user. Past analyses have provided assessments of the impacts of regulations on pesticide use, evaluations of commodity program impacts and an estimate of alternative export policies including a grain embargo. Analyses now underway will provide additional information on environmental and resource problems, as well as information on the impacts of technological change in agricultural production.

Operating and Updating Costs:

Cost per run: $150-250 for a three-year run with a single landclass LP.

Annual maintenance cost: The costs are shared by ISU, NRE and SCS in variable proportions depending on the agency's interest in a particular analysis. The NRE fixed cost is .35 SPY plus secretarial support.

Model Name: ISU/NRE National-Regional LP Model

Responsible Person(s): Klaus Alt, Resource Systems Branch, NRE, FTS 865-4422

Model Description:

The ISU/NRE LP models are a set of operational linear programming models, an associated data base and a collection of computer software which can tailor the models to address various analytical needs. The models vary in their specifications, but they cover the main field crop and livestock production of the 48 contiguous States.

Model activities are based upon 105 producing areas derived from Water Resources Council ASAs, nine soil types, 330 crop rotations, 12 tillage/soil conservation methods, four livestock classes, 28 market regions, and 176 transport/marketing routes, and irrigated/dryland conditions. Great detail is possible with the model; however various levels of aggregation for reporting ranging from sub-state to multi-state and national are permissable. Model users may determine the level of detail needed depending on the scope of coverage desired. For each activity model solutions indicate cost of production, water usage, land usage, energy usage, soil loss, yields, transport costs, input levels, nitrogen usage. Models can be configured to provide detail on specific regions, production practices, and policy/program options. For example, the impacts of a falling ground water table in the Ogallala acquifer, or of alcohol production from biomass conversions, upon regional and national parameters such as income, resource use and conservation objectives can be specified.

Model Applications:

Model results indicate the least cost methods and location of producing a targeted level of the nation's primary food and fiber requirements. Model results are normative in nature and must therefore be analyzed in a "with or without" rather than "present versus future" context. This feature makes this type of model particularly effective for agricultural, environmental, and resource policy analysis, since the impacts of such policies upon the production potential, resource use, crop production costs and other variables can be estimated and displayed. This allows the analysis of the trade-offs between productive capacity and environmental problems, for example, under a wide range of potential policies on resource use. Many such analyses have been completed; viz, 1967 OBERS Projections, 1970-71 EPA-RAND Study, 1975 Water Resource Assessment, 1980 RCA Analysis. Current analyse relate to energy production from agricultural sources, such as gasohol from grain or biomass; soil conservation; impacts of declining water tables and increasing water costs upon irrigation water use; competition for range land for livestock production versus other uses; crop export potential; and other analyses now getting underway, including the upcoming 1985 RCA Analysis.

Operating and Updating Costs:

Cost per run: $500 to 2,000 depending on number and kinds of changes since last model run.

Annual cost: The costs of the ISU/NRE LP models are shared by ISU, NRE, and SCS, in varying proportions depending on the interests of each agency in a particular analysis. The NRE fixed cost is .85 SPY plus secretarial support.

Model Name: National Input/Output Model

Responsible person(s): Gerald Schluter 447-8489
Food and Agricultural Policy Branch, NED

Model Descriptions:

The 1972 national input/output (I/O) Model developed by the U.S. Department of Commerce consists of a 496 sector transaction matrix and a 496 sector total requirement matrix. From these tables open partially closed I/O models containing 48 sectors (16 farm, 9 food processing) and containing 85 sectors (19 farm, 44 food processing) were developed.

The input/output model permits analysis of the direct and indirect linkages between the farm, food processing, and non-farm sectors.

Model Applications:

Quantification of farm-nonfarm linkages, impact analysis.

Operation and Updating Costs:

Cost per run: $20

Annual maintenance: $500

Model Name: NIRAP-IIASA-MSU Model (NIIM)

Responsible Person(s): D. Maxwell, D. Watt 447-8470
Trade Policy Branch, IED

Model Description:

NIIM is a U.S. agricultural model being assembled (basically from existing models) to fit into the world agricultural modeling system being developed at the Institute for Applied Systems Analysis (IIASA) in Austria. NIIM is being developed in a cooperative project with Michigan State University (MSU) starting from the MSU agricultural model, the USDA National-Interregional Agricultural Projections (NIRAP) System and other existing models. NIIM, together with the IIASA world modeling system, will be installed on the USDA computer system in FY-81. NIIM and the IIASA system are intended for mid-long term world projections and policy analysis. The IIASA system itself includes a world trade equilibrium solution package and a set of simplified country models for countries/regions of the world including Europe, Japan, the rest of Asia, the socialist world, and other major producers or consumers of world agricultural commodities. The model is under construction at USDA and MSU under a Cooperative agreement.

Model Applications:

Mid-long term projections and policy analysis.

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: National-Interregional Agricultural Projections (NIRAP) System

Responsible Person(s): D. Watt 447-8470
Trade Policy Branch, IED

Model Description:

NIRAP is a simulation-long term projections model of the U.S. agricultural sector. It produces national aggregate estimates, supply and utilization estimates for 31 commodities, and estimates of production location by state. It is used primarily for long-range resource use projections (e.g., OBERS projections) and other special long-term studies. Parts of NIRAP are being used to develop NIIM for the IIASA world modeling system (see NIIM description) and, in turn, NIIM improvements are being corporated into NIRAP.

Model Applications:

Long-term projections of U.S. agricultural output and prices. Latest use is for projections for Ogallala Aquifer project.

Operating and Updating Costs:

Cost per run: $20

Annual maintenance cost: $500

Model Name: POLYSIM

Responsible Person(s): David Banker 447-7330
Food and Agricultural Policy Branch, NED

Model Description:

POLYSIM is an annual simulation model of the agriculture sector. The model estimates a simultaneous price - quantity equilibrium solution between the livestock and crop sectors. The individual commodities contained in the model include wheat, corn, barley, oats, soybeans, grain sorghum, soybean meal, cattle and calves, hogs, sheep, turkeys, chickens, eggs, and milk. In addition to estimating the supply-utilization and prices of the above commodities it also estimates cash receipts, production expenses, farm income, deficiency payments and reserve storage payments.

Essential to running POLYSIM is a set of baseline projections. These baseline projections coupled with a set of elasticities (user has the option of altering) provide the basis for generating a new price-quantity equilibrium solution once the supply-demand balance or government commodity program variables have been altered.

Model Applications:

Policy and Impact Analysis

Operating and Updating Costs:

Cost per run: $7

Annual maintenance cost: $3000.

Model Name: The World Grains, Oilseeds and Livestock (GOL) Model

Responsible Person(s): Karen Liu 447-8133
Trade Policy Branch, IED

Model Description:

The GOL model is a multiple-commodity and multiple-region world agricultural model consisting of supply, demand and trade components for 12 commodities and 28 regions. Model equations were developed to reflect: (1) important technical input-output relationships, (2) the economic behavioral pattern of the world grain-oilseed-livestock economy, and (3) the institutional environment. GOL is a system of about 1,000 simultaneous linear equations. The model was built primarily for making long-range projections of the world food supply-demand balance under alternative scenarios. Recently, the model has also been used as a policy analysis tool. However, the structure of the original GOL model presents limitations for use in policy analysis. In order to improve the usefulness of the GOL model as an analytical tool for global long-run projections and intermediate-run policy analysis, we have reviewed the model, critiqued its shortcomings and defined a set of revision and updating activities. These activities include: a rebasing of the model to 1976 from 1970, the addition of non-linear equations, and the installation of the revised model in a new non-linear solution package (the MIT TROLL system). The revised GOL is targeted to be up in FY-81.

Model Applications:

Global long-run projections and intermediate-run policy analysis. Examples of uses are the Global 2000 Study and consistency checks for the WINROCK Livestock Study and the FAO AT-2000 projections.

Operating and Updating Costs:

Cost per run: Old GOL - $20 for a one year projection

Annual maintenance cost: $5,000

Macroeconomic and Other Nonagricultural Models

Model Name: BEA Macro Forecasting Model

Responsible Person(s): Randy Zeitner 447-2317
Economic Indicators and Statistics Branch, NED

Model Description:

Simultaneous equation quarterly macro-forecasting model.

Model Applications:

Forecasting macro variables.

Operating and Updating Costs:

Cost per run: $25

Annual maintenance cost: N/A

Model Name: Comparative Economic Adjustment Model

Responsible Person(s): Harold Taylor, Broomall, Penn.-- FTS 596-5772
River Basins Branch, NRED

Model Description:

This model can estimate, trace, compare basic direct and indirect effects on inter and intra-sectional flows of money and other specified economic activities, while maximizing national or regional incomes for each of several alternative policies that place limitations on sectors of the economy. This procedure uses interactive computer programs which are based on a combination of input/output theory, linear-parametric programming theory, and a computer programming method which can rebalance a I/O transactions matrix, sector by sector, for different levels of national or regional income. This model can also aggregate sectors. The model can be used to evaluate total impacts of alternative decisions concerning the use of limited resources, such as maintaining productive land in agriculture or its conversion to other uses.

Model Applications:

Policy analyses and developmental impacts at local and regional levels.

Operating and Updating Costs:

Costs per run: 10 x 10 sector with LP $10-20, varies with size of model.

Annual maintenance cost: $5-10 for 10 x 10 annual updating

Model Name: Energy Impact Assessment Model (Coaltown)

Responsible Person(s): Lloyd Bender, Montana State University
Economic Development Division

Model Description:

The coaltown model is designed to assess impacts of energy projects in sparsely-settled counties of the Northern Great Plains. These impacts include various socioeconomic impacts as well as the impacts on governmental expenditures and revenues. More specifically, the model simulates future employment, population, wages, migration, State and future employment, population, wages, migrations, State and local tax receipts and intergovernmental transfers, and local government expenditures for counties in Montana, Wyoming, and North Dakota. For more information see: Lloyd D. Bender, George Temple, and Larry Parcels, "An Introduction to the Coaltown Impact Assessment Model" ESS Staff Report, May, 1980.

Model Applications:

Analyze fiscal impacts of different energy related activities with respect to local government revenues and expenditures as well as the effects of potential changes in State and local tax laws on the ability of local communities to cope with rapid growth situations.

Operating and Updating Cost:

Cost per run: Nominal

Annual maintenance cost: Nominal

Model Name: Forecasting Models for PCE and FLB Interest Rates and Prime Rate

Responsible Person(s): Paul Sundell 447-2317
Economic Indicators and Statistics Branch, NED

Model Description:

Single equation least squares including distributed lag variables.

Model Applications:

Forecasting interest rates

Operating and Updating Costs:

Cost per run: $5

Annual maintenance cost: $225

Model Name: Nebraska Panhandle Input/Output Model

Responsible Person(s): Cliff Jones, Little Rock, Arkansas--FTS 740-5447
Resource Systems Branch, NRED

Model Description:

A 45-Sector I/O Model, households endogenous. Model presents agricultural detail; 7 agricultural sectors. One payments vector and one final demand vector, excluding households. Model is generated using Nebraska state I/O Model and employment, income, and production data for panhandle area.

Computes flow table direct requirements and inverse matrices; output, income, and employment multipliers. Computes effects of final demand changes by sector.

Model Applications:

General: Economic forecasting/impact estimates by sectors.

Specific: Output, income, and employment effects of sugarbeet industry on panhandle economy.

Operating and Updating Costs:

Costs per run: $60.00

Annual maintenance cost: $700.00

Model Name: Project LINK

Responsible Person(s): William E. Kost 447-8470
Trade Policy Branch, IED

Model Description:

Project LINK is a system of macroeconomic models for the major countries in the world that have been linked together via a trade model in order to solve a world macroeconomic system with endogenous feedback relationships between countries. The purpose of the model is to study the world macroeconomic economy and world trade. Emphasis is on the international transmission mechanism for inflation and economic growth.

Model Applications:

Forecasting, policy analysis, projections. Used to provide international scenarios for Situation and Outlook work. Forecasts used for exogenous international variables in USDA models.

Operating and Updating Costs:

Cost per run: Subscription fee: $10,000

Annual maintenance cost: N/A

Model Name: Regional Financial and Monetary Policy Model

Responsible Person(s): Currently under contract to Chase Econometrics
Richard French, Economic Development Division
is contract officer

Model Description:

The overall objective of this modeling effort is to determine the regional effects of national monetary policies as they relate to regional and metropolitan and nonmetropolitan economic activity. More specifically, the model determines if national monetary policy has differential regional impact:

The simulation model construction involves modeling (a) regional determination of production, income, and employment, (b) regional financial markets, and (c) the avenues through which monetary policies can influence regional economic conditions either directly or through differential effects on regional financial markets. Regional units are the four Census Regions divided into metropolitan and nonmetropolitan areas. Currently, the model is not operational. Chase Econometrics schedule is to complete the initial modeling by June 30, 1981. EDD plans to work with the completed model after it is conveyed to EDD by Chase.

Model Application:

Analyze regional effects of monetary actions

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance cost: Unknown

Model Name: River Basin Resource Conservation, Development and Planning Models

Responsible Person(s): Gary Taylor, Branch Chief--447-8459
River Basins Branch, NRED

Model Description:

Numerous linear programming models appropriate for the analysis of resource conservation and development alternatives in cooperative river basin study areas have been developed by the River Basins Branch. At the present time, more than 20 models are operational or under development. As outlined below, these models share many basic features, but the level of detail incorporated in model activities, the resource conservation and development activities, included and the constraints used vary widely across study areas depending upon the needs of study sponsors, the resource problems identified, and the availability of data. Study areas covered by these models range from 200 to 20,000 square miles or more. Models previously developed in the river basin program have covered water resource regions and major river basins.

The objective functions in most models is minimization of the costs of production for major crops with activities specified by crop, soil resource group, sub-areas of a watershed, and conservation tillage practice. Constraints cover mimimum regional production required, available cropland, and allowable soil loss through erosion.

Model Applications:

Applications of river basin models are typically for evaluation of resource conservation and development policies and plans in terms of their possible inpact on production cost, spatial distribution of coal use, resource use, and environmental consequences such as soil loss.

Operating and Updating Costs:

Cost per run: $5 - $50

Annual maintenance cost: Division costs for model development per year over the 1-3 years devoted to a river basin study range from $15,000 - $50,000.

Model Name: Small Area/State I/O Model System

Responsible Person(s): Cliff Jones, Little Rock, Arkansas--FTS 740-5447
Resource Systems Branch, NRED

Model Description:

A) 38-Sector I/O Model, northwest Louisiana, household endogenous. Computes output, income, and employment effects by sector.

B) 29-Sector Arkansas Model, household endogenous. Computes output, income, and employment effects by sector.

Models generated using National I/O Models and local economic data.

Model Applications:

Economic impacts of natural resource development, land use changes, water management projects on agriculture and total economy.

Operating and Updating Costs:

Costs per run: $180.00

Annual maintenance cost: $800.00

NOTE: Model needs updating - all based on 1963 and 1967 National I/O Models

Commodity/Sub-Sector Specific Agricultural Models

-- Domestic --

Livestock

Model Name: Buxton Dairy Policy Simulator

Responsible Person(s): Boyd Buxton, University of Minnesota
Animal Products Branch, NED

Model Description:

A regional model developed to predict milk production, prices, fluid use, government purchases, farm revenue, and consumer expenditures for dairy products. Estimates an equilibrium solution based upon exogenously provided demand and supply elasticities, baseline values for prices, production, Class I usage, consumption, etc. and deviations of dairy policy variables from baseline levels.

Model Applications:

Predicts the impacts of policy changes on the dairy sector and government dairy support program expenditures.

Operating and Updating Costs:

Cost per run: $4

Annual maintenance cost: $250

Model Name: Chase Econometrics Dairy Model

Responsible Person(s): Cliff Carmen 447-8636
Animal Products Branch, NED

Model Descriptions:

This is a quarterly econometric model of the U.S. dairy sector. The model endogenously estimates milk production, cow numbers, the farm level milk price, and the supply-utilization and prices of fluid milk, butter, cheese, and non-fat dry milk. The model endogenously estimates government purchases of dairy products under alternative government dairy price support options.

Model Applications:

Forecasting milk supplies, demand, prices, and government costs under alternative policy assumptions.

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance cost: None

Model Name: Dairy Sub-Sector Simulator (ECONPAK)

Responsible Person(s): Lynn Sleight 447-8840
Animal Products Branch, NED

Model Description:

Simulates parts or all of the dairy industry using equations estimated exogenously.

Model Applications:

Forecasting supply, demand, prices, policy analysis.

Operating and Updating Costs:

Cost per run: $150

Annual maintenance cost: $500

Model Name: Egg Demand

Responsible Person(s): Bill Henson, Pennsylvania State University
Animal Products Branch, NED

Model Description:

A three equation model which estimates changes in consumer demand for eggs resulting from changes in consumer income, retail price of eggs, and the CPI deflator.

Model Applications:

Maintaining benchmarks on consumer response to changes in egg prices; income elasticities; trends.

Operating annd Updating Costs:

Cost per run: $6

Annual maintenance cost: $30

Model Names: Interregional Beef Competition Model

Responsible Person(s): Kenneth Nelson, University of Illinois

Model Description:

A linear programming model of beef supply, demand and flows given various production and marketing cost information.

Model Applications:

Policy and structure

Operating and Updating Costs:

Cost per run: $5-$10

Annual maintenance cost: $100

Model Name: King-Dahlgram Spatial Equilibrium Dairy Model

Responsible Person(s): Ken Koester 447-7577
Data Services Center

Model Description:

The model allocates either a fixed or variable supply of milk to a user-selected set of markets based upon retail demand functions, and transportation costs to meet Class I demands (plus specified reserve). The model endogenously estimates blend prices and transportation costs. Surplus milk is allocated to Class III use based upon user specified Class III prices. Milk movements between markets and shadow prices in particular markets are calculated.

Model Applications:

Analyze intermarket and interregional flows of milk and the effects of changes in regional milk supplies, demands, and prices.

Operating and Updating Costs:

Cost per run: $70

Annual maintenance cost: $500

Model Name: Livestock-Feed Matrix generator

Responsible Person(s): George Allen, Roger Hoskin 447-8444
Crops Branch, NED

Model Description:

Generates an annual allocation of total feed quantities by specific feedstuffs to different classes of livestock and poultry. The allocations are based on prevailing economic conditions and summed using grain-equivalents, roughage-equivalents, and livestock inventories and production. For a given livestock census, estimates of feed-equivalent and roughage-equivalent demand can be made. Permits estimation of short-run changes in feed demand based on live stock numbers.

Model Applications:

Primarily situation and outlook

Operating and Updating Costs:

Cost per run: $20

Annual maintenance cost: $50

Model Name: Poultry Cost and Returns

Responsible Persons(s): Sandra LeSesne 447-4997
Animal Products Branch, NED

Model Descriptions:

Computes feed cost per unit, other production costs per unit, total production costs per unit, marketing costs per unit, wholesale price and returns per unit given the prices of feed, broilers, turkeys, eggs, production, and marketing margin information.

Model Applications:

Situation and outlook, policy analysis

Operating and Updating Costs:

Cost per run: $4

Annual maintenance cost: $120

Model Name: Price Flexibility

Responsible Person(s): Eldon Ball, Richard Stillman 447-8636
Animal Products Branch, NED

Model Description:

This model is a price flexibility matrix consistent with the classical constraints from demand theory.

Model Applications:

Policy analysis, forecasting and outlook

Operating Updating Costs:

Cost per run: Not automated

Annual maintenance cost: $30

Model Name: Price Spreads vs. Cost Trends for Beef and Pork

Responsible Person(s): Karen D. Parham 447-4997
Animal Products Branch, NED

Model Description:

Simple OLSQ regression model of meat price spreads vs. marketing costs.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: $10

Annual maintenance: $50

Model Name: Quarterly Livestock and Poultry Model

Responsible Person(s): Richard Stillman 447-8636
Animal Products Branch, NED

Model Description:

The model is a quarterly econometric model of the livestock sector. This recursive system of equations estimates farm and wholesale production and prices of lambs, chickens, turkeys, fed and non-fed beef and hogs. Model is currently in the development stage.

Model Applications:

Policy analysis, situation and outlook

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance cost: Unknown

Model Name: Riley Spatial Equilibrium Dairy Model

Responsible Person(s): Lynn Sleight 447-8840
Animal Products Branch, NED

Model Descriptions:

The model allocates a fixed supply of milk to a user specified set of markets based upon retail demand functions, and transportation costs to meet Class I demands (plus specified reserves). The model endogenously estimates blend prices and transportation costs. Surplus milk is allocated to Class III use based upon a user specified Class III price. Milk movements between individual markets and shadow prices in particular markets are calculated.

Model Applications:

Analyze intermarket and interregional flows of milk.

Operating and Updating Costs:

Cost per run: $20

Annual maintenance cost: $500

Model Name: Simplified Model of the U.S. Beef Industry

Responsible Person(s): Ray Brokken, Corvallis Oregon, ESS

Model Description:

A linear programming model of feed requirements of the U.S. Beef industry by stage of growth and production methods.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: $30

Annual maintenance: $200

Crops

Model Name: Cotton Econometric Model

Responsible Person(s): Keith Collins 447-8776
Crops Branch, NED

Model Description:

The model is a simultaneous equation model of the raw cotton market. The demand side estimation is based on data through 1978; the supply side on data through 1976. The model has sectors for U.S. mill consumption, imports of foreign importers, and exports of foreign exporters. U.S. exports and carryover are computed from identities as residuals. There is a supply equation for each of the four regions of the cotton belt. The model provides multipliers for a variety of macroeconomic and cotton sector policy variables.

Model Applications:

Policy analysis, situation outlook

Operating and Updating Costs:

Cost per run: $3

Annual maintenance cost: $150

Model Name: Cotton Industry Input-Output Model

Responsible Person(s): Keith Collins, Ed Glade 447-8776
Crops Branch, NED

Model Description:

The model is a national input-output model with functional and regional disaggregation. Functional areas include cotton production, ginning, warehousing, and merchandising. Regions for these functions include the Southeast, South Central, Southwest, and West which together comprise the cotton belt.

There are a total of 96 industry sectors in the model. It is based on the 1972 national input-output model format of the Department of Commerce.

Model Applications:

Policy analysis, impacts of cotton industry, and structural changes.

Operating and Updating Costs:

Cost per run: $10

Annual maintenance cost: $200

Model Name: Crops Econometric Model

Responsible Person(s): Bob Green, Roger Hoskin, Ed Fryar 447-8444
Crops Branch, NED

Model Description:

The crops model consists of three sub models 1) the feed grain model, 2) the wheat model, and 3) the soybean model. Each of these may be solved independently or in any combination with the others. The models are linked through prices; and when solved, determine equilibrium supply, utilization, and price levels simultaneously. The crops model is linked to the livestock sector, domestic macro-economy, and international markets exogenously.

Any subset of variables may be exogenized by the user. If an endogenous demand variable is exogenized, than the respective sub model is no longer constrained to equilibrium. The system then solves for the level of excess supply or demand.

Model Applications:

Policy analysis, forecasting, base line generation, situation and outlook.

Operating and Updating Costs:

Cost per run: $15

Annual maintenance cost: $5000

Model Name: Feed Grain Storage and Transportation Model

Responsible Person(s): Bill Gallimore 447-2317
Food Economics Branch, NED

Model Description:

A linear programming, time-staged, trans-shipment model for feed grains. National in scope.

Model Application:

Optimization of flows, transportation, storage, and location of storage facilities.

Operating and Updating Costs:

Cost per run: $60

Annual maintenance cost: Nominal

Model Name: FEEDSIM

Responsible Person(s): Forrest D. Holland 447-8470
Trade Policy Branch, IED

Model Description:

Used for policy analysis of U.S. domestic feed grain and soybean programs. Model is non-linear stochastic simulation model. Solves for U.S. supply-utilization balance, prices, and program variables for feedgrains and soybeans, using user specified synthesized functions.

Model Applications:

Policy analysis of feedgrain and soybean programs. Used for impact analysis of U.S. gasohol program.

Operating and Updating Costs:

Cost per run: $4

Annual maintenance cost: $200

Model Name: Orange Model

Responsible Person(s): Roger Conway 447-7290
Fruits, Vegetables and Sweetners Branch, NED

Model Descriptions:

This is an annual econometric model with two major blocks of equations for determining supply and demand. The major equations in the supply block are for estimating bearing orange acreage in Florida and Central and Southern California. The second block determines farm and retail prices, and fresh processed usage, given supply, U.S. retail demand for processed and fresh oranges, derived demand by packers and processors in Florida and California, optimal allocation of oranges between fresh and processed use, and stock levels for processed oranges. The model is in the developmental stage.

Model Applications:

This model will have equal applicability to policy analysis and long run forecasting.

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance: Unknown

Model Name: Rice Econometric Model

Responsible Person(s): Roger Hoskin, Bob Green 447-8444
Crops Branch, NED

Model Description:

This is a model of the U.S. Rice market. Demand is a simultaneous equation system. Supply is OLS. Export demand is exogenous. Supply is estimated on a state by state basis. Any subset of variables may be "exogenized" by the user. Has been used to estimate supply, prices, and carry-over. Can be solved for equilibrium supply, demand, and prices.

Model Applications:

Policy analysis, situation & outlook

Operating and Updating Costs:

Cost per run: $10

Annual maintenance cost: $250

Model Name: SM-42 Micro Model

Responsible Person(s): James M. Harris, University of Illinois 447-8487
Food Economics Branch, NED

Model Description:

A linear programming, time-staged, trans-shipment model for feed grain marketing in a multi-county area. Flows, number and size of firms, and selection of transport modes are endogenously determined within the model.

Model Applications:

Optimize grain flow, number and size of grain firms, and mode of transportation.

Operating and Updating Costs:

Cost per run: $20

Annual maintenance cost: Nominal

Model Name: WHEATSIM

Responsible Person(s): Forrest D. Holland, Jerry A. Sharples 447-8470
Trade Policy Branch, IED

Model Description:

Used for analysis of U.S. domestic wheat programs. Model is non-linear programming model, relying on user specified synthesized economic functions and commodity program parameters. Model also is a stochastic simulation model. Solves for U.S. supply-utilization balance, prices, and program variables, such as set-asides, for wheat.

Model Applications:

Policy analysis of U.S. wheat programs.

Operating and Updating Costs:

Cost per run: $2

Annual maintenance cost: $200

Retail Demand and Food Price

Model Name: Consumer Demand: Aggregate U.S. Model

Responsible Person(s): John Craven 447-9200
Food Economics Branch, NED

Model Description:

Complete Linear Expenditure demand systems for aggregate U.S. annual time series with 11 demand categories from Department of Commerce personal consumption expenditure data. The Food-At-Home and Food-Away-From-Home demand categories are of primary interest.

Model Applications:

At this stage primary focus has been on estimation of existing demand structure. Can be used for simulation purposes. Can be used as the demand component in other (larger) model systems.

Operating and Updating Costs:

Cost per run: $30

Annual maintenance cost: Nominal

Model Name: Lamm-Westcott Food Price Forecasting Model

Responsible Person: R. M. Lamm, Paul C. Westcott 447-8801
Economic Indicators and Statistics Branch, NED

Model Description:

The model consists of 20 simultaneous linear equations linking changes in retail food prices to changes in food industry input costs. It is quarterly and estimated using three-stage least squares. An additional set of 21 equations to forecast current exogenous variables (farm level prices, wage rates, energy costs, and packaging material prices) allows the model to function as a pure forecasting tool. Its major advantages are its simplicity in use and design; its theoretical purity; and its superior forecasting record.

Model Applications:

Currently applied to forecast retail food prices as part of situation and outlook program, and to analyze the impact of changing food sector input costs on retail food prices.

Operating and Updating Costs:

Cost per run: Nominal.

Annual maintenance cost: Nominal.

Model Name: Monthly Retail Food Price Model

Responsible Person: Paul Westcott 447-8801
Economic Indicators and Statistics Branch, NED

Model Description:

A two equation linear model provides estimates of price movements of the two major food price components of the CPI--food at home and food away from home. Exogenous data are the index of prices received by farmers for foodstuffs (PRF), the Producer Price Index (PPI) for sugar, and the food marketing cost index (MCI). The dynamic nature of the food price determination process is approximated by estimating distributed lags on the exogenous variables.

Model Applications:

The model is primarily designed to provide one-month ahead monthly forecasts, to be run following the release dates of the exogenous variables. However, if exogenous data are forecast by the user--for example, by using futures markets--monthly retail food price forecasts can be made for longer time-horizons.

Operating and Updating Costs:

Cost per run: $3

Annual maintenance cost: Approximately $100.

Model Name: The Complete Food Demand Systems of the United States

Responsible Person(s): Kuo S. Huang 447-9200
Food Economics Branch, NED

Model Description:

The demand systems include two parts: (1) The Composite Demand System, and (2) The Disaggregate Food Demand System; the former covers 12 food categories and one non-food sector, the latter covers 42 food commodities and one non-food sector.

Both the demand systems are estimated simultaneously by the constrained maximum likelihood method, and the parametric restrictions derived from classical demand theory are incorporated. Annual data are used.

Model Applications:

Primary use has been in estimating the demand structure for food commodities. However, potential uses include projecting changes in prices and quantities consumed for food commodities at both aggregate and disaggregate levels and as the demand component in other model systems.

Operating and Updating Costs:

Cost per run: $80

Annual maintenance cost: Nominal

Model Name: The Hierarchic Food Demand System of the United States

Responsible Person(s): Kuo S. Huang 447-9200
Food Economics Branch, NED

Model Description:

The hierarchic food demand system covers 49 food commodities and one nonfood sector. The demand system is generated by making use of a prior information set including own-price and income elasticities, expenditure weights, and money flexibility. However, some rigid assumptions of separable utility structure are imposed.

Model Application:

Primary purpose is to demonstrate that a complete demand matrix can be obtained under very limited economic information.

Operating and Updating Costs:

Cost per run: N/A

Annual maintenance cost: Nominal

Farm Income and Cost of Production

Model Name: Cost of Production Projectors

Responsible Person(s): Robert Olson, Cole Gustafson 447-4190
Economic Indicators and Statistics Branch, NED

Model Description:

Three related models are used to project production costs. First, yields and production levels for livestock are projected to the year of interest using multiple regression techniques. Then yields and prices paid, prices received, and secondary product price indexes are used by the crop cost of production projector to compute production costs for the ten major crops. In addition to price indexing the quantities of fertilizer and interest are incremented. Along with price indexing in the livestock model, feed and interest quantities are adjusted. Livestock costs are projected for feeder cattle, fed cattle, dairy, hogs, and sheep.

Model Applications:

These forecasting models produce results used by both the commodity and policy analysts.

Operating and Updating Costs:

Cost per run: $10.00 - project yields and production levels
$10.00 - project crop production costs
$25.00 - project livestock production costs

Annual maintenance cost: $2200.

Model Name: Farm Firm and Related Households Behavior Simulator

Responsible Person(s): Lyle Schertz, Linda Calvin 447-8059
Farm Sector Economics Branch, NED

Model Description:

Systems Dynamics is used to model the use of resources in farming activities and related households activities. A relatively simple model is operational and future plans are to have a family of variations of this model operating by fall 1981. The potential advantages of using Systems Dynamics is that it has flexibility to reflect behavior in a wide range of conditions. Our experimentation will test these ideas and the usefulness of such models for measuring distribution effects.

Model Applications:

Measure distribution effects of different policies and economic conditions.

Operating and Updating Costs:

Cost per run: Nominal

Annual maintenance cost: Nominal

Model Name: Farm Income Calculator

Responsible Person: Gary Lucier 447-4190
Economic Indicators and Statistics Branch, NED

Model Description:

The Farm Income Calculator, written in Speakeasy and Fortran, can be run on a quarterly or an annual basis. Forecasts for crop receipts are returned for individual crop categories and for the aggregated categories. Forecasts for farm prices, production, marketing percents, marketing patterns (for the quarterly version), and CCC loan activity are used in the calculations. Receipts for some crops which are included in the aggregate totals are exogenous to the calculator and are pulled in from a separate program. As in the case of crop receipts, livestock receipts are based on farm prices and production estimates provided by commodity analysts. Gross farm income is the summation of the forecasts of total cash receipts from marketings and income from all other sources. Gross income is then subtracted from total farm production expenses to arrive at realized net farm income. The summation of realized net income and the value of the change in farm inventories yields net farm income. In the quarterly version of the income calculator, quarterly production expenses are interpolated from annual forecasts utilizing the BEA "Minimum Change Variance Interpolation Method" program. Seasonal factors used by the quarterly calculator for deriving cash receipts on a seasonally adjusted annual rate basis are computed using the "X-11" Census program. Tables are printed using OASIS table writers.

Model Applications:

The Farm Income Calculator is used monthly in forecasting quarterly and annual net farm income statistics.

Operating and Updating Costs:

Cost per run: $20

Annual maintenance costs: $1000

Model Name: Farm Income Simulator (FINSIM)

Responsible Person: Gary Lucier 447-4190
Economic Indicators and Statistics Branch, NED

Model Description:

The Farm Income Simulator (FINSIM) is a comprehensive behavioral model presently being developed in EIS. The model is run using the General-Analytical-Simulation-Solution-Program (GASSP). FINSIM contains blocks for cash receipts, other income, production expenses, inventory change, and net and cash income. The main purposes in developing this model are three-fold: 1) to provide another piece of data to the farm income analyst, 2) to improve turnaround time on scenario forecasts, and 3) to reduce the cost and time spent forecasting farm income statistics.

Model Applications:

FINSIM will primarily be used to provide forecast information to the farm income analyst.

Operating and Updating Costs:

Cost per run: $5

Annual maintenance costs: $800

Model Name: FLIPSIM

Responsible Person(s): Ken Baum, Tom Hatch 447-8168
Farm Sector Economics Branch, NED

Model Description:

FLIPSIM is a dynamic farm firm simulator. Currently the model is in the development stage. Dr. Richardson at Texas A&M has been centrally involved. He has recently been modifying the model substantially. DC ESS staff are undertaking to combine the Richardson product with an optimization submodel (XMP linear programming library of FORTRAN subroutines, University of Arizona). It is anticipated that initial runs will be made in mid-summer, 1981.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance cost: Unknown

Model Name: Frick Farm Income Simulator (ICEAGE)

Responsible Person(s): George Frick, University of New Hampshire
Lynn Sleight, Animal Products Branch, NED

Model Description:

The model calculates dairy farm income based upon milk prices and other dairy specific exogenous variables (feeding costs, prices paid, etc.). Breakeven milk price levels and price levels required to maintain dairy farmers real income level are calculated.

Model Applications:

Policy analysis and also as a check on the consistency of short and long run milk supply estimates.

Operating and Updating Costs:

Cost per run: $2

Annual maintenance cost: $300

Model Name: Great Plains Representative Farms

Responsible Person(s): Verel Benson, Lincoln, Nebraska -- FTS 541-5371
Water Branch, NRED

Model Descriptions:

These models are linear programming (LP) representations of typical farming operations in the Great Plains Area. Basic farm types are being developed from 1974-78 Agricultural Census data for groups of counties conforming to Crop Reporting Service Districts. Current work is focusing on the Nebraska area with three basic farm types being modeled -- 160 acres all-irrigated, 320 acres with 160 acres-irrigated and 6000 acre cattle operation. As these systems are developed for Nebraska additional farms in the Plains will be included.

Model Applications:

In development stage. Policy analysis, S-R/Mid-term impact of resource use and management funds.

Operating and Updating Costs:

Not available--models are in development stage.

Model Name: Illustrative Farm Simulator

Responsible Person(s): Cole Gustafson, Tom Hatch 447-4190
Economic Indicators and Statistics Branch, NED

Model Description:

The model is an aggregation program where cost of production survey data are used to develop a whole farm budget consisting of several crop and livestock enterprises. The acreage and crop mix of each farm are determined by census data. The model determines machinery, input and tax costs and then computes various profitability and liquidity statistics. Currently the model is being developed and is expected to be operational by mid-summer.

Model Applications:

The primary use will be for policy analysis. When doing analysis with individual cost of production budgets, the well-being of the farm firm cannot be determined because information regarding the combination of enterprises is unknown.

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance cost: Unknown

Commodity/Sub-Sector Specific Agricultural Models

-- International --

Single Country

Model Name: Argentine Grain Exports

Responsible Person(s): Myles Mielke 447-8133
Latin America Branch, IED

Model Description:

Medium term forecasting model which will contain structural equations designed to do simulation analysis of the effect of price and policy changes on Argentine grain exports. Grain exports covered will include wheat, corn, and sorghum. Variables will cover: endogenous - market prices; exogenous - income, policies, weather, stocks, cattle inventory; policy variables - export taxes, and exchange rates. Equations will be estimated by regression, using historical supply and demand data. The model is currently under construction.

Model Applications:

Forecasting, policy analysis

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: Australian Grains Export Supply

Responsible Person(s): Paul Johnston 447-8378
North America and Oceania Branch, IED

Model Description:

A recursive econometric model of wheat, barley, grain sorghum exports from Australia and not destination specific. Eighty-two variables are found among the 35 equations: 56 variables are endogenous; 26 are exogenous.

For wheat, production is derived for each of the five wheat producing states. Domestic demand is for food, feed, and ending stocks. Exports are a residual - production less domestic demand.

For barley and sorghum, total Australian production is derived. Exports are again a residual after domestic use - food, feed, or stocks - is subtracted from production.

Model Applications:

Estimates impact of U.S. prices on Australian exports and impact of Australian exports on potential world price of wheat, barley, and sorghum.

Operating and Updating Costs:

Cost per run: $5

Annual maintenance cost: $1050

Model Name: Bangladesh farm profit/cost model

Responsible Person(s): Richard Nehring 447-8229
Asia Branch, IED

Model Description:

A profit/cost and demand function model based on duality theory has been constructed. From the model one can directly derive the output supply and input demand elasticities with respect to land and other fixed factors of production. One can also derive own price elasticity of supply and input demand. The model is multiequation, depending on the number of demand functions.

Model Applications:

Policy analysis.

Operating and Updating Costs:

Cost per run: $20

Annual maintenance cost: $5000

Model Name: Canadian Grains and Oilseeds Model

Responsible Person(s): Mary Anne Normile 447-8376
North America and Oceania Branch, IED

Model Description:

Econometric model, of which 18 equations are stochastic and 13 are deterministic. Contains 41 endogenous and 23 exogenous variables. Equations representing area, price, domestic utilization, ending stocks are estimated via OLS for Canadian wheat, barley, and rapeseed. (Export demand for rapeseed is also estimated; exports are determined as the residual of production less all other uses for wheat and barley.) U.S. prices of wheat, barley, soybeans, and soybean products are included as explanatory variables to capture cross-price effects. The model was developed for USDA by Dr. John Spriggs (University of Saskatchewan) and is written in GASSP.

Model Applications:

Primarily policy analysis: estimates impact of increase in statutory rail rates on grain production, impact and long run elasticities, effects of an export constraint on supply and demand intentions for wheat. Model can also be used to forecast production, acreage, domestic use and exports given assumed values of exogenous variables to 1985.

Operating and Updating Costs:

Cost per run: $10

Annual maintenance cost: $1100

Model Name: Carbohydrates Demand in Colombia and Venezuela

Responsible Person(s): Luis R. Sanint 447-8133
Latin America Branch, IED

Model Description:

The model was developed to measure the impact of shifts in demand and supply schedules for rice and related sources of carbohydrates upon traditional imports of grains by Colombia and Venezuela. The two countries are treated as separate cases. Due to problems of multicollinearity, the estimates will be obtained by using principal components analysis. The model will provide own-and-cross-price elasticities. The data span is 1963-1977; current retail price data was not available for several commodities.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: $25

Annual maintenance cost: $500

Model Name: Greek Agricultural Sector model

Responsible Person(s): Steve Magiera 447-6809
Western Europe Branch, IED

Model Description:

Econometric supply/demand model of grains, oilseeds, and livestock sectors of Greece. Model is being built in Greece and is in preliminary stages of development.

Model Applications:

Analysis of EC enlargement and possibly S. European component of GOL model.

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: Korean Agricultural Sector model (KASMUS), USDA version

Responsible Person(s): John Dyck 447-8229
Asia Branch, IED

Model Description:

USDA version has two of five components of the full model. These are a resource allocation and production model (RAP), and a demand-price-foreign trade model (DEMAND).

The RAP model is a linear programming model and provides output information on supply of 15 crops, supply of 5 livestock commodities, agricultural farm income, feed requirements, demand for inputs to agriculture, mechanization levels, all on an annual basis, given input information about yields, area, prices of products and inputs, interest rates, etc.

The DEMAND model contains a simultaneous linear system of equations and gives as output: food consumption (on-and-off-farm), producer prices, consumer prices, agricultural trade, degree of food self-sufficiency, per caput nutrition levels, when non-food price indices, non-farm income, population, world prices, domestic food supply, and lagged farm income are specified.

Model Applications:

Policy analysis and long term forecasts (15 year).

Operating and Updating Costs:

Cost per run: $20

Annual maintenance cost: $300

Model Name: South African Corn and Wheat Model

Responsible Person(s): Shahla Shapouri 447-4863
Africa and the Middle East Branch, IED

Model Description:

Model for each crop contains 5 equations: yield, area, food demand, feed demand, and stocks. It is an econometric model using mainly annual statistics provided by the Republic of South Africa.

On the supply side, yield and area are simultaneously estimated. Supply depends upon producer prices, substitute goods prices, world prices, technology variables (fertilizer) and dummy variables representing weather variation.

Demand is estimated based upon consumer prices, substitute commodity prices, income, a consumer price index, and a livestock price index. Since there was more than one set of consumer prices (there were six, representing various consumer bulk discount prices, varying also between different grades of grain), principal components were used to give one series of price data.

Model Applications:

Built for forecasting purposes, but can be used for policy analysis

Operating and Updating Costs:

Cost per run: $15

Annual maintenance cost: $200

Model Name: Soviet Grain Balances

Responsible Person(s): Jim Cole 447-8380
Eastern Europe and USSR Branch, IED

Model Description:

The 11 individual grain balances each calculate individual cell entries for the supply and utilization tables used by ESS and FAS in numerous publications. Each relies on a good deal of exogenous information, but much of this work has already been done, and is built into the model (seeding rates, for example). Output includes production, trade, yield, as well as seed, industry, food, feed, and dockage uses of the grains. Each grain sub-sector contains 15 equations.

Model Applications:

One year forecasts

Operating and Updating Costs:

Cost per run: $5

Annual maintenance cost: $250

Model Name: Soviet Oilmeal Balance

Responsible Person(s): Jim Cole 447-8380
Eastern Europe and USSR Branch, IED

Model Description:

Calculates production of total oilmeal, and production of individual oilseed meals. In addition, crush totals are also calculated by oilseed. Model relies on exogenous inputs of crush rates, meal extraction rates, and trade flows. 50 equations.

Model Applications:

One year forecasts

Operating and Updating Costs:

Cost per run: Nominal

Annual maintenance cost: Nominal

Model Name: Soviet Sugar-Beet Balance

Responsible Person(s): Jim Cole 447-8380
Eastern Europe and USSR Branch, IED

Model Description:

Calculates individual cell entries for the supply and utilization table for Soviet sugar-beets. Relies on exogenous inputs including sown area, production, population, per capita consumption, and trade. 15 equations.

Model Applications:

One year forecasts

Operating and Updating Costs:

Cost per run: Nominal

Annual maintenance cost: Nominal

Model Name: Spanish Agricultural Sector model

Responsible Person(s): Steve Magiera 447-6809
Western Europe Branch, IED

Model Description:

Econometric supply/demand model of grains, oilseeds, and livestock sectors of Spain. Prices are mainly policy determined and there are a few simultaneous equations in model. Approximately 50 equations. The model is currently under construction.

Model Applications:

Analysis of EC enlargement and possibly S. European component of GOL model.

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: Taiwan Agricultural Import Demands

Responsible Person(s): Donald Sillers 447-8229
Asia Branch, IED

Model Description:

Simple econometric model of agricultural import demands for wheat, soybeans, coarse grains, and cotton. Basic model will concentrate on import response to international prices, along with real GDP trend, lagged livestock numbers, and textile export demand. Second stage will incorporate effects of policy variables: tariffs, quotas, price controls; and agricultural production incentives.

Model Applications:

Short and medium run forecasting; later version will allow policy analysis.

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: USSR Grain Production (USSRGP)

Responsible Person(s): Jim Cole 447-8380
Eastern Europe and USSR Branch, IED

Model Description:

USSRGP calculates shares of republic sown area belonging to a particular weather reporting station. These weights are used in conjunction with weather index factors that are supplied by the analyst. After summing by republic, the combination of the two is used to illustrate the impact of favorable or unfavorable weather for a particular region on the entire republic. Impacts are calculated not only by region, but also by grain. Eleven grains are used, along with 33 regions. The model will be operational May 1, 1981.

Model Applications:

One year forecasts of Soviet grain production, by grain

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: Wheat and Rice Agricultural Sector Model for Japan

Responsible Person(s): Cathy Jabara 447-8143
Trade Policy Branch, IED

Model Description:

Used to analyze impact of Japanese rice policies. Econometrically estimated, simultaneous solution. Solves for imports, production, stocks, use of wheat and rice in Japan. Dynamic model.

Model Applications:

Analysis of Japanese wheat and rice policies.

Operating and Updating Costs:

Cost per run: $10

Annual maintenance cost: $50

Multi - Country

Model Name: Bilateral Trade Flow Model

Responsible Person(s): Alan Webb 447-8470
Trade Policy Branch, IED

Model Description:

Cross-country model to assess the overall impact of policies as well as physical and economic factors on wheat trade flows. Initial efforts will focus on the effect of bilateral trade agreements in determining wheat trade patterns. If successful, cost effective, and useful, the methodology developed will be applied to trade patterns of other agricultural commodites.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: Unknown

Annual maintenance cost: Unknown

Model Name: EC Cotton Trade model

Responsible Person(s): Tham Truong 447-6809
Western Europe Branch, IED

Model Description:

An econometric trade share model for EC trade in cotton. Consists of 14 trade share equations of an Armington type, 14 total import equations and supply equations for Spain, Greece, and Portugal. The model is currently under construction.

Model Applications:

Analysis of EC enlargement.

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: EC Least-Cost Feed Program

Responsible Person(s): Philip L. Paarlberg 447-8470
Trade Policy Branch, IED

Model Description:

Least-Cost linear programming model for Dutch and British swine, broiler, and dairy feed rations. Model gives levels of feedstuff use for 40 ingredients by livestock type. Model is used for micro analysis of the effects of EC and U.S. policy changes on commodity use in livestock feeds.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: $1.20

Annual maintenance cost: $20

Model Name: EC Soy Model

Responsible Person(s): Philip L. Paarlberg 447-8470
Trade Policy Branch, IED

Model Description:

Used to analyze EC policy changes in soybean and product trade. Model is econometrically estimated system. Calculates EC and non-EC supply-utilization balances and prices for soybeans, soybean meal, and soybean oil.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: $15

Annual maintenance cost: $45

Model Name: Export Marketing Board

Responsible Person(s): Philip L. Paarlberg, Forrest Holland 447-8470
Trade Policy Branch, IED

Model Description:

Model is used for analysis of the impacts of establishing an export marketing board for wheat. It is a stochastic simulation model relying on user specified consumption, production, ending stocks and objective functions. Model can handle up to 300 iterations of a five year sequence. Solution uses a non-linear programming algorithim to maximize the user specified objective function. Model solves for U.S. and foreign supply-utilization balance, prices, welfare payments, and variances in the world wheat market.

Model Applications:

Policy analysis of different forms of marketing board conduct in world grain markets.

Operating and Updating Costs:

Cost per run: $1

Annual maintenance cost: $100

Model Name: Food Aid Allocation Model

Responsible Person(s): William E. Kost, Carol Goodloe 447-8470
Trade Policy Branch, IED

Model Description:

Model generates food aid allocation levels and allows for a ranking of countries according to different Food Aid Program priorities. Technique--index constructed for a country by weighting and summing variables (socio-economic indicators), index is then weighted by population size. User assigns priority (weights) to variables and selects variables depending on the objective of food aid.

Model Applications:

Calculate country food aid levels implied by policymakers' chosen weights for conflicting food aid objectives.

Operating and Updating Costs:

Cost per run: Nominal

Annual cost: N/A

Model Name: Food Demand and Nutritional Impact in Developing Countries

Responsible Person(s): Mervin Yetley 447-8926
Latin America Branch, IED

Model Description:

Supply and demand equilibrium model, based upon price and income elasticities of demand (estimated) and supply and subsistence level elasticities (assumed values). Changes in quantities of food commodities demanded and supplied can be estimated for changes in price(s) and income. These quantities are then converted to nutritional (caloric) equivalents. Currently only the demand component of the model is operational.

Model Applications:

Policy analysis and short range forecasting

Operating and Updating Costs:

Cost per run: $50

Annual maintenance cost: $5000

Model Name: Net Trade Model

Responsible Person(s): William E. Kost 447-8470
Trade Policy Branch, IED

Model Description:

The net trade model accounts for the interaction between major trading countries by commodity. Each commodity model is a system of econometrically estimated export supply and import demand functions, by country, that are solved simultaneously for net trade (export and import quantities) and world price levels. The export supply and import demand functions are specified as functions of own price, other commodity prices, production, income, population, and other demand shifters. Net trade models for individual commodities are linked together through cross price variables. Net trade models have been developed for wheat (18 countries), coarse grain (13 countries) and soybeans (14 countries). The wheat and coarse grain models are linked and operational.

Model Applications:

Forecasting, policy analysis. Occasionally used for Situation and Outlook work. Used to analyze impact of Food Aid Scheme.

Operating and Updating Costs:

Cost per run: $15

Annual maintenance cost: $5000

Model Name: OPEC Food Import Demand Model

Responsible Person(s): Jim Coyle 447-8376
Africa and the Middle East Branch, IED

Model Description:

Model was developed to project import demand for 72 agricultural commodities by the eight Middle East OPEC countries. Single equation regression models are used with various exogenous variable specifications and functional forms. The functional forms used are linear, doublelog, variable parameter, semilog, and log inverse.

Model Applications:

Policy analysis, forecasting

Operating and Updating Costs:

Cost per run: $12

Annual maintenance cost: $6500

Model Name: Producer Marketing Board

Responsible Person(s): Philip L. Paarlberg, Forrest D. Holland 447-8470
Trade Policy Branch, IED

Model Description:

Model is used for analysis of a producer marketing board with both export and domestic marketing authority. Model first solves a maximization problem to establish output quota, then performs a constrained maximization problem. It is a stochastic simulation model, handling up to 300 iterations of a five year sequence, to solve for U.S. and foreign supply-utilization balances, prices, income-expenditure, and variances for wheat.

Model Applications:

Policy analysis of producer marketing boards.

Operating and Updating Costs:

- Cost per run: $5
- Annual maintenance cost: $100

Model Name: Structural Relationship between Economic Development and Agricultural Trade

Responsible Person(s): Tom Vollrath 447-8106
Agricultural Development Branch, IED

Model Description:

Construction of reduced form of international offer curves. Net agricultural trade for exporters and importers are the primary endogenous variables. Research variables and measures of production instability may also be considered endogenous variables in the subset system of equations. Exogenous variables include factors representing supply, demand, and policy interference. Cross section and time series data used. Estimation of sets of signal equations will involve OLSQ of pooled and single period cross sectional data. The model is currently under construction.

Model Applications:

Structural relationships should emerge that will be useful for policy formulation and analysis

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: Sub-Sahara model

Responsible Person(s): Shahla Shapouri 447-4863
Africa and the Middle East Branch, IED

Model Description:

The model is divided into two parts: production (area and yield) and demand (production and net imports). It is an econometric model and provides information about supply of major food crops. Sub-Saharan Africa was divided into 5 regions: Sahel, East, West, Central, and South. The annual aggregate statistics for each region were used in the study. The area equation was estimated using input information about lagged area, prices and risk related to the yield. Yield was estimated by looking at a probability distribution of historical data.

The demand side of the model is a single equation estimated for each crop in each region using input information about prices, income, and consumer price indexes.

Model Applications:

Used for forecasting purpose and policy analysis

Operating and Updating Costs:

Cost per run: $30

Annual maintenance cost: $900

Model Name: UK Grains Model

Responsible Person(s): Dale Leuck · 447-6809
Western Europe Branch, IED

Model Description:

Contains equations explaining domestic grain supply, livestock inventories, demand for domestic and imported maize and soybeans used for feed, seed, human and industrial demand, farm stock, and processors' stocks. Identities compute total imports or exports and trade share equations explain the U.S. share of wheat, maize, and soybean imports. Equations are estimated by OLS, although Cochran-Orcutt procedure is applied to cases where autocorrelation exists. The model will be operational May 1, 1981.

Model Applications:

Forecasting under alternate EC policy scenarios

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: Wheat Export Policy

Responsible Person(s): Philip L. Paarlberg 447-8470
Trade Policy Branch, IED

Model Description:

Use will be to analyze changes in wheat policies in the U.S., Canada, Australia, and EC. Model explicitly mixes marketing board and competitive conduct in world markets. Model is econometrically estimated over 1960-77 time period. Solves for supply-utilization balance and prices for each wheat exporter. Specification allows for importer discrimination among different exporters of wheat by using elasticity of substitution methodology. The model is currently under construction.

Model Applications:

Policy changes in major wheat exporters.

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: WINROCK International Feed and Livestock Model (WIFLM)

Responsible Person(s): Pat O'Brien 447-8457
World Analysis Branch, IED

Model Description:

A world livestock model is being developed for IED by the Winrock International Livestock Research and Training Center. Emphasis is on short-mid-term forecasts and policy analysis of the feed-livestock economy and its impact on U.S. agricultural trade.

Model Applications:

Short term forecasts and policy analysis

Operating and Updating Costs:

Cost per run: Not available

Annual maintenance cost: Not available

Model Name: World Oilseeds and Products Model (WOPM)

Responsible Person(s): Gary Williams 447-8470
Trade Policy Branch, IED

Model Description:

WOPM is an econometric model of the internal markets for six oilseeds (soybeans, peanuts, cottonseed, rapeseed, copra and palm kernels) and their oil and meal derivatives in seven world regions (U.S., Brazil, the European Community, Canada, Japan, Africa and Asia-Oceania plus a rest-of-the-World residual trading region). The model consists of 377 equations, 101 of which are behavioral whose coefficients are estimated simultaneously using the twostage, principal components estimator on 19 years of data (1960-1978). The full model is currently being validated and will be operational within a few months.

Model Applications:

Policy analysis

Operating and Updating Costs:

Cost per run: $15

Annual maintenance cost: $2500

Model Name: World Sugar Model

Responsible Person(s): Roger Conway, Hosein Shapouri 447-7290
Fruits, Vegetables and Sweetners Branch, NED

Model Descriptions:

This is a trade flow model using a quadratic programming algorithm. There are eleven regions in this model and optimal production, consumption, and prices for each region can be determined as well as an 11 by 11 matrix of trade flows between regions. Policy simulations can be introduced by appropriate adjustment of the linear portion of the objective function, the introduction of additional constraints, and deletion of trade flow possibilities from the model. Another stocks "Region" is currently being added. This model is still in the experimental stage.

Model Applications:

The primary value of this model is for policy analysis and forecasting a year ahead.

Operating and Updating Costs:

Cost per run: $4

Annual maintenance Cost: Unknown

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Model Name: World Wheat Trade Model

Responsible Person(s): Forrest D. Holland 447-8470
Trade Policy Branch, IED

Model Description:

Used for analysis of trade policy impacts in world wheat market. Model is a competitive spatial equilibrium model which can handle non-linear equations. Model uses synthesized schedules to simulate the consequences of a policy change on supply-utilization balances, prices, trade flows, and welfare for wheat in 15 regions.

Model Applications:

Trade policy analysis - eg. bilateral agreements

Operating and Updating Costs:

Cost per run: $4

Annual maintenance cost: $100

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