Economic Foundations of PECAS

Mike McCoy, Director

Urban Land Use and Transportation Center

Institute of Transportation Studies

University of California, Davis

ABAG

February 5, 2009

PECAS Draws from Two Venerable Economic Methods: Input-Output and CGE Urban Models

- Leontiff created the first I-O table for the U.S. in 1947

- I-O tables used by most nations and most multilateral banks

- I-O tables (usually IMPLAN) used by many Federal agencies

- IMPLAN used by Calif. DWR.

- A fancier I-O w/econometric model (REMI) increasingly used

- Many MPOs use I-O in their sociodemographic models

CGE Models

- CGE models in use since late 60s (Mills & Muth)

- Dozens published. Mostly concentric ring cities with 3-5 rings

- Historically simultaneous equations models were used. Still in use:
  - Anas model. Elena Safirova's version runs for Washington, D.C. region in sketch form
  - MetroScope at Portland Metro. One-off, in-house model.

- Now, CGE models are generally algorithmically equilibrated
  - Shown to be equivalent to simultaneous equations models

Advantage of I-O Structure

- 500 X 500 matrix of all goods and services (U.S. BEA) is crunched into industry sectors and HH types
  - Social Accounting Matrix (SAM)

- Spatialized down to 500 zones, based on employment by sector and HHs by type in zones

- The model operates on all Industries, HHs & employees, by type, to maintain the flows of goods & services through time

- We get macroeconomic indicators, such as product by zone, county and State and exports by zone, county and State

Advantages of CGE Framework

- Production and consumption functions for each industry and HH

- Iterative bidding for all inputs (goods, labor, travel, goods movements, and floorspace), until markets clear

- Gives consumer surplus and producer surplus measures
  - The accepted standard for aggregate economic welfare
  - Also, gives welfare by HH income class and by employee sector

- Can compare results with aggregate models of regions and the State

Summary

- PECAS builds off of MEPLAN (U.K., 80s and 90s) and uses best ideas from other more-recent models

- No other I-O/CGE models in general use. All others are one-off models or sketch models.
  - PECAS Oregon is running. SACOG PECAS almost done. SANDAG model halfway. SCAG starting.

- UrbanSim being developed by several cities and some MPOs, but is a location choice model for enterprises and HHs. No I-O and no bidding for inputs.
  - No macroeconomic indicators and no microeconomic indicators