

Michigan Statewide Freight Model Update



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Jesse Gwilliams, MDOT

History

Michigan Statewide Truck Travel Demand Forecasting Model

- Commodity Flow Model
- 1996
- 1998 (updated)

Old Model

Commodity Production

- 1993 CFS Statewide Commodity Origin Totals
 - STCC
- CBP Employment Totals
 - SIC

Mode Split

Old Model

CFS 93 Michigan

- US AVG
- MICH AVG

Destination Choice Model

- 1992 Benchmark Input-Output Accounts
- Consuming Industries

Distribution

Old Model

- Gravity Model
- CFS93 Michigan Trip Lengths
- Other Considerations
- CAZ to TAZ Disaggregation

Truckloads and Values

Old Model

- Trucks – Michigan O&D's
 - 1994 and 1996
- Value – CFS 93

Import-Export Model

Old Model

- Trade Data in Dollars
 - Convert to Tons
- Tons per Commodity
- I/O Destination Choice

Forecasts

Old Model

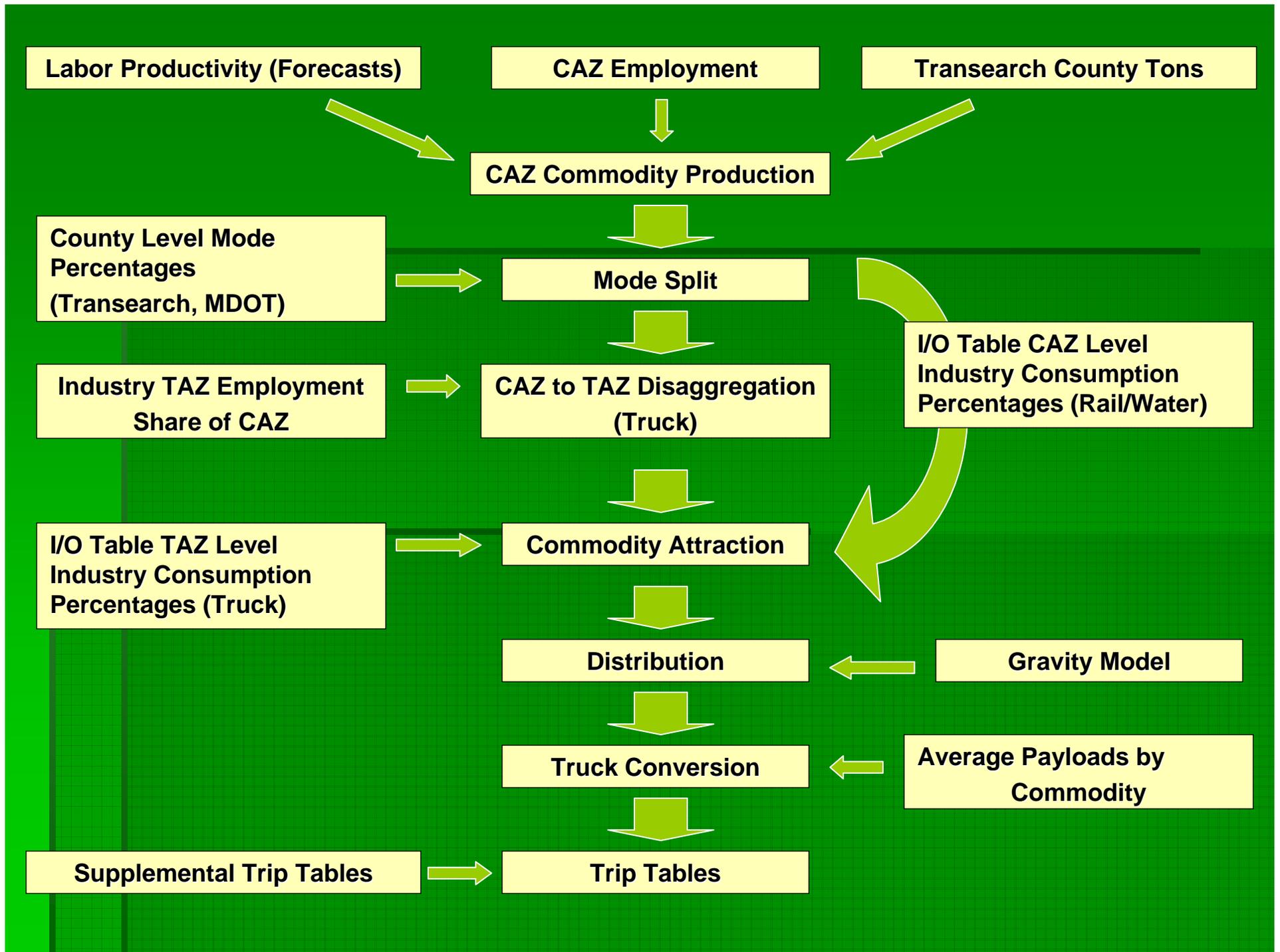
- Employment
- Labor Productivity
- Import/Export (Growth Rate)
 - +4% Detroit
 - +6.5% Bluewater
 - +2.2% Sault Ste Marie

The New Model

- Follow Similar Steps
- Data Sources
 - Transearch
 - Claritas/CBP/Statistics Canada
 - O&D Surveys
- Include Canada in Process
- CAZ - TAZ

Freight Model Commodities

CODE	COMMODITY	CODE	COMMODITY
1	Agriculture Crops	29	Petroleum or Coal Products
2	Agriculture Animal	30	Rubber and Plastics
8	Primary Forest Materials	31	Leather Products
10	Metallic Ores	32	Clay, Cement, Glass or Stone Products
11	Coal	33	Primary Metal Products
13	Crude Petroleum and Natural Gas	34	Fabricated Metal Products
14	Nonmetallic Ores and Minerals	35	Machinery
20	Food Products	36	Electrical Equipment
22	Textile Mill Products	37	Transportation Equipment
23	Apparel or Finished Textiles	38	Technical Instruments and Equipment
24	Lumber and Wood Products	39	Misc Manufacturing Products
25	Furniture and Fixtures	40	Waste or Scrap Material
26	Paper and Pulp Products	41	Misc Freight Shipments
27	Printed Matter	43	Mail
28	Chemical Products	50	Secondary Traffic



Commodity Production

Production Models

- CAZ Employment & Other
- CAZ Transearch Tons (All Modes)

Employment Files

- One CAZ File and one TAZ File
- Other Variables
- Able to Forecast?

Commodity Production

- 28 separate commodity production equations
- Example:
$$P20 = (426.991 * EMP20) - (0.184 * EMP20sq) + (0.00005279 * EMP20cb)$$
Weighted least squares regression – weighted by Pop06

AdjRsq = 0.987

Result: File with Modeled CAZ Tons by Commodity

Mode Split

Mode Split

- By County and Commodity

Result:

- File with CAZ Tons by Commodity and Mode

CAZ to TAZ Disaggregation (truck)

- TAZ Industry Employment Percentage of CAZ
- Includes Other States and Ontario

Result

- TAZ Tons Produced by Commodity

Attraction Model

- I/O Industry Consumption Percentages
- TAZ Level

Distribution

- Gravity Model
 - Trip Length Distribution
 - Friction Factors

Trucks

Convert Tons to Trucks Using Average Payload Factors

- O&D Surveys
- Past CFS

Supplemental Trip Tables

- Municipal Waste to TAZ Level
- Quick Response Supplement for Service Vehicles
- No Separate Import/Export Model

Rail and Water

- Remain at CAZ Level
- Similar I/O Attraction
- Networks

Forecasting

- Current Statewide Model Industry Groups
- “Straight Line” Some Variables
- Labor Productivity
 - Trend Analysis

Calibration

- CADT
- Northern Michigan, U.P.
- Metro Detroit
- Urban Truck Models
- O&D Surveys

Model Status

- Halfway Through Commodity Production Models
- CAZ/TAZ Employment Files and Disaggregation Files Done
- I/O Table Done
- Adding Latest Survey Data

Model Status

- Jesse Frankovich, MDOT, Programming Model in TransCad
- Interface Being Created
- Time?
 - In Calibration Stage by End of Year
 - Potential Additions

Urban Model Use

- Coordinate with Urban Models
 - Further Disaggregation?
- Refine Employment Input

Questions?

Jesse Gwilliams

Michigan Department of Transportation

Statewide and Urban Travel Analysis Section

GwilliamsJ@michigan.gov

517-373-9355