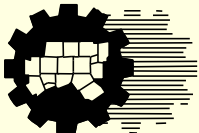# Using ACS & CTPP Data for Market Segmentation of Households and Employment in the North Central Texas Regional Travel Model

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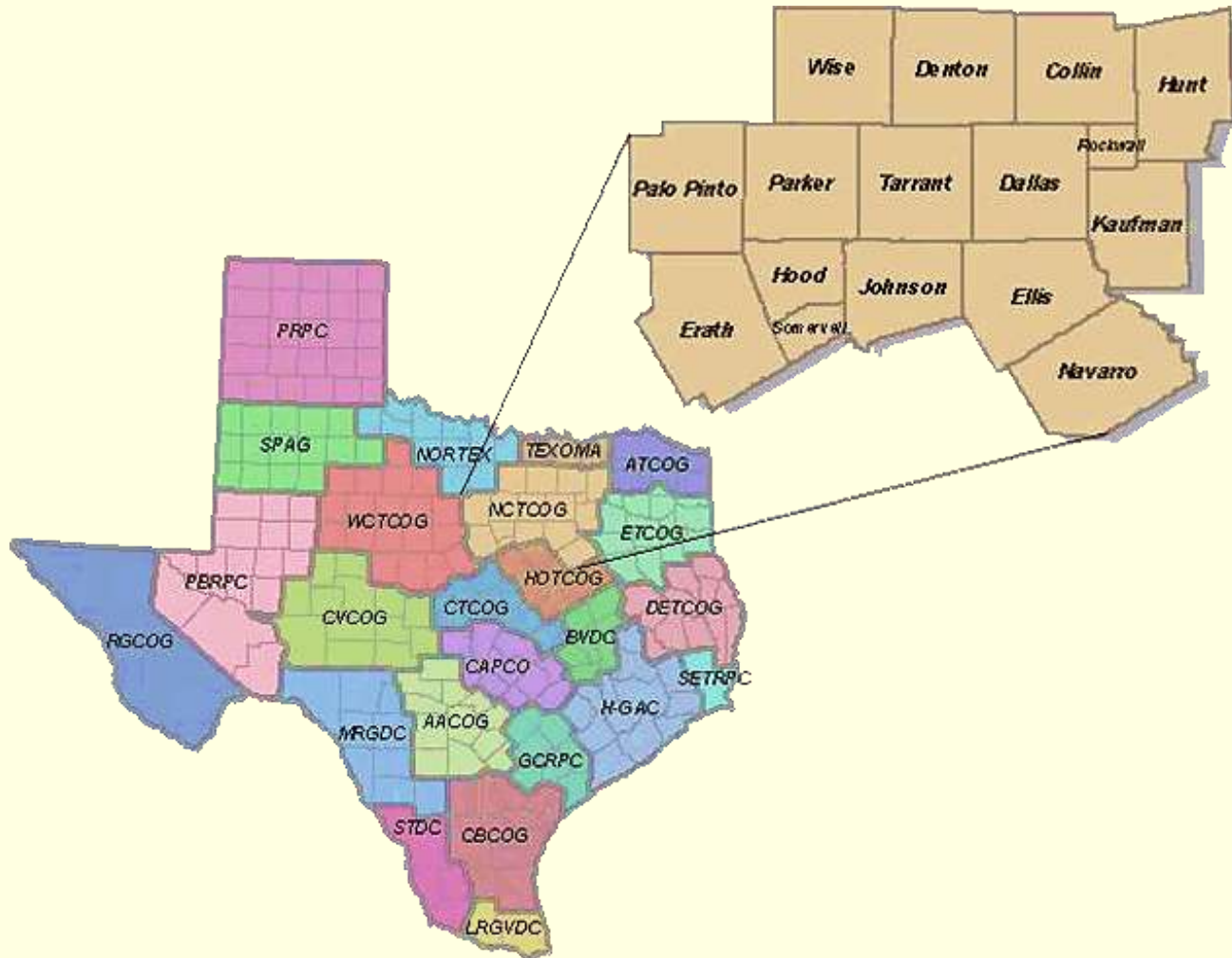North Central Texas Council of Governments

Outline
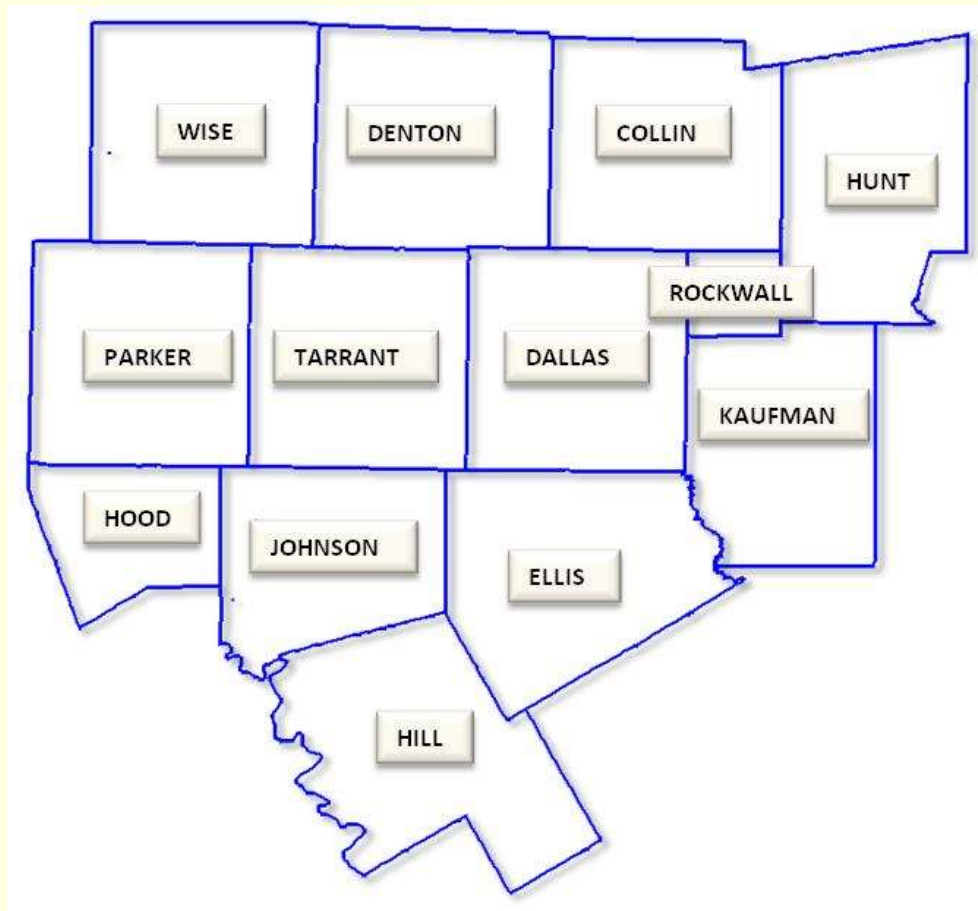
- Background
  - NCTCOG Region
  - ACS/CTPP Geography
- Use of ACS and CTPP in Market Segmentation
  - Market Segmentation of Households
  - Market Segmentation of Employment
- Final Thoughts

North Central Texas Council of Governments (NCTCOG)

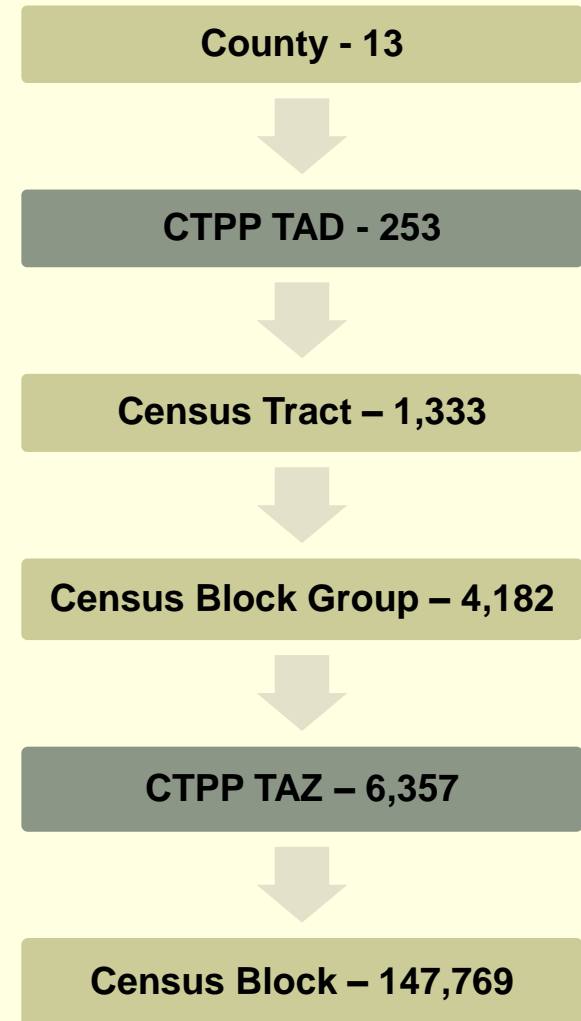# NCTCOG Modeling Area

Modeling Area:
12 County + Hill

Area:
10,000 square miles

2014 Households:
2,466,263

2014 Household Population:
6,860,993

ACS and CTPP Geography Hierarchy

- ACS Geographies include County, Tract, Block Group, and Block.

- CTPP geographies are Travel Analysis Districts (TAD) and Travel Analysis Zones (TAZ).

- NCTCOG defined the TADs based on census tracts. TADS nest in counties.

- NCTCOG defined the TAZs to nest in block groups.

County - 13
↓
CTPP TAD - 253
↓
Census Tract – 1,333
↓
Census Block Group – 4,182
↓
CTPP TAZ – 6,357
↓
Census Block – 147,769

USE OF ACS AND CTPP IN HOUSEHOLD MARKET SEGMENTATION

HH Market Segmentation Goal

- NCTCOG investigated various household characteristics to determine the best market segmentation for home-based trip purposes.

- For Home-Based Work, it was the combination of
  - Number of Workers in Household
  - Vehicles Available
  - Household Income

- As a result, our goal was to get the distribution of households for Number of Workers in Household by Vehicles Available by Household Income for each block group.

HH Market Segmentation Data

- The data needed for our goal was not available directly, so need to combine various data sources.

- Creating the market segments
  - Iterative Proportional Fitting
  - Fusion of data sources
    - CTPP 2006-2010 residence-based data for seed
    - ACS 2014 5-year for segmentation totals

HH Segmentation Process- Step 1A

Step 1a: Identify the row control targets from American Community Survey (ACS) 2014 5-year.

- Row: Number of Workers (4) x Number of Vehicles (4)

  B08203 (Number of Workers in Household by Vehicles Available)

  - Census Tract Geography

- Convert geography to Block Group

  - Each block group inherits the distribution of workers by vehicles from the census tract to which it belongs.

  - Convert the distribution to shares by dividing by the total number of households in the census tract.

  - Convert to block group by multiplying the census tract shares by the total number of households in each block group.

HH Segmentation Process – Step 1B

Step 1b: Identify the column control targets from American Community Survey (ACS) 2014 5-year.

- Column: Income (4)

- B19001 (Household Income in Past 12 Months (In 2014 Inflation-Adjusted Dollars))

- Table already is in Block Group format.

HH Segmentation Process – Step 2

Step 2: Find an initial seed matrix from Census Transportation Planning Products (CTPP) 2006-2010

A112310 (Number of Workers in Household by Vehicles Available by Household Income in the past 12 months (2010$))

 - TAD Geography

We assume that the block group will have the same distribution as the TAD to which it belongs.

While the seed matrix is in TAD geography and the other tables are using block group, the seed only needs to contain the relative size of each cell to the others. Therefore, we do not need to update the seed to match the total household in the block group.

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HH Segmentation Process – Step 3 - Iterative Proportional Fitting

Step 3: IPF - Process for adjusting values in a seed matrix to meet specific column totals (Column Marginals) and row totals (Row Marginals)

Row Marginals:
Workers x Vehicles(16) [Block Group]

W0V0	
W0V1	
…	
W3V3	

Seed Matrix:
Workers x Vehicles (16) x Income (4) [Block Group]

	Inc1	Inc2	Inc3	Inc4
W0V0				
W0V1				
…				
W3V3				

Column Marginals: Household Income (4) [Block Group]

Inc1	Inc2	Inc3	Inc4

USE OF ACS AND CTPP IN EMPLOYMENT MARKET SEGMENTATION

Employment Segmentation Goal

In Employment Segmentation, we are trying to understand the locations of jobs for various segments of workers.

Goal – To get a distribution of the workers at the workplace by their household income by industry group for each TAZ.

Data Sources Used:

- CTPP 2006-2010 - Workplace-based tables which give workers broken down by their workplace.
- Bureau of Economic Analysis (BEA) 2013
- 2010 Longitudinal Employer Household Dynamics (LEHD)

Employment Segmentation Process

Step 1: Identify the row and column control targets from Census Transportation Planning Products (CTPP) and other data sources.

- Row Marginal: Industry (3)
  - Use 2013 BEA county data to get employment by industry group.
  - Convert county data to TAZ using 2010 LEHD, modified by local data.

- Column Marginal: Income (4)
  - A203101 - Household Income in the past 12 months (2010$)(4) - TAD
  - TAZ inherits its distribution from the TAD to which it belongs, but is scaled by the number of HH in the TAZ.

Employment Segmentation Process

Step 2: Find an initial seed matrix from Census Transportation Planning Products (CTPP) –Industry (3) x Income (4)

- Use CTPP Workplace-based tables which give workers broken down by their workplace by TAD.
  - A202205C - Industry (3) by Earnings in the past 12 months (2010$)(4)
  - A203202C - Household income in the past 12 months (2010$)(4) by Earnings in the past 12 months (2010$) (4)

- These two tables are combined to produce a table of Industry(3) x Income (4) for each TAD. For each earning category, that the industry distribution will be the same for all income groups.

- TAZ inherits its distribution from the TAD to which it belongs.

Step 3: IPF

Final Thoughts

- CTPP could use a table of industry by income for workplace-based tables.

- In CTPP Data, for purposes of stability and the reduction of sampling error, NCTCOG used the TAD level data instead of the TAZ level data. Later realized that many tables were available at the Census Tract level, which we would have used instead.
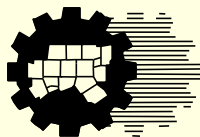
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