

# Metropolitan Planning Organization Travel Forecasting State of the Practice

Presented To  
MWCOC/TPB  
Travel Demand Forecasting Committee

By  
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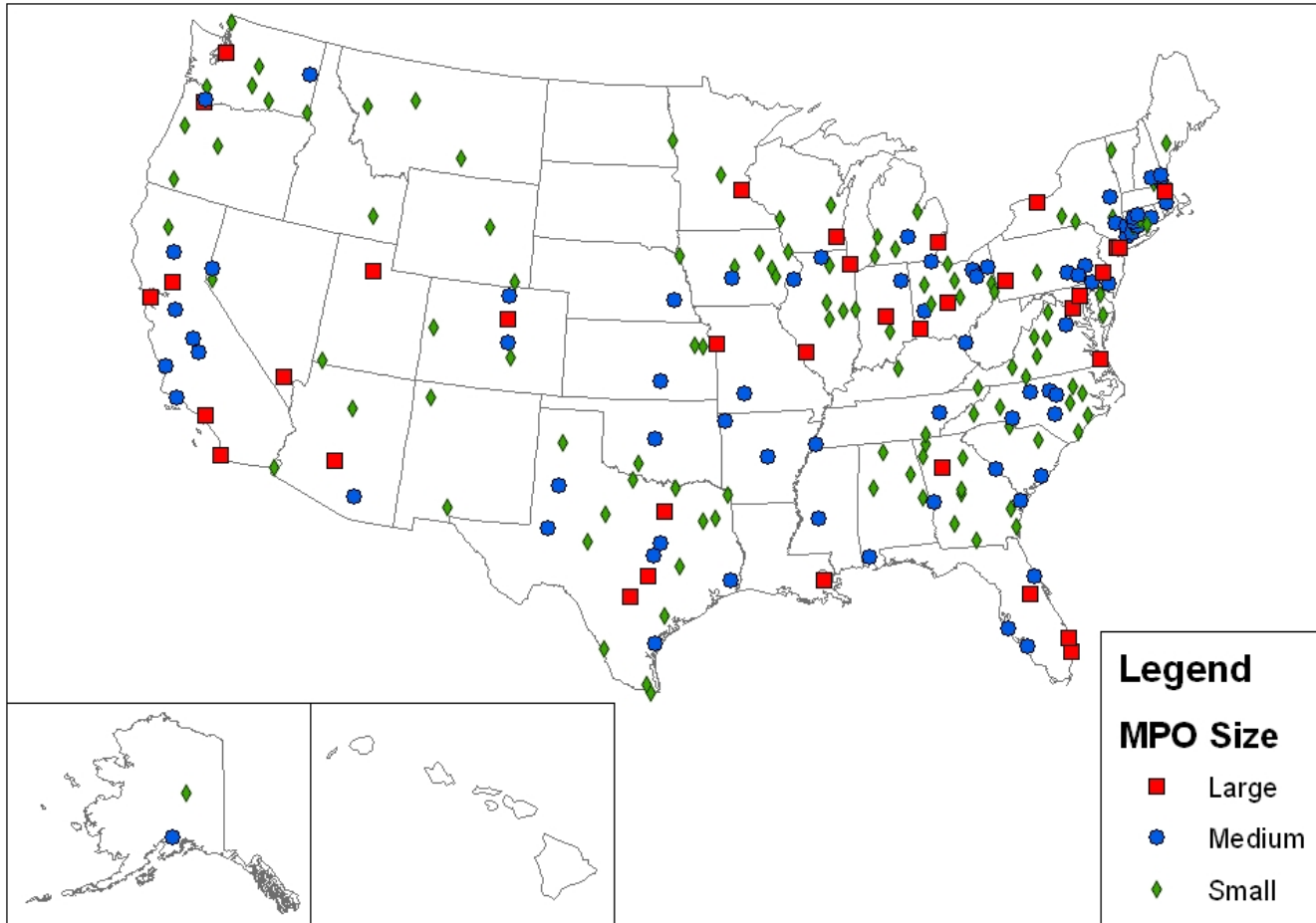
# Disclaimer

The presentation that follows is based on a survey conducted for the TRB Committee to determine the “State-of-the-Practice” of MPO Travel Forecasting Procedures in 2005. The Final Report of the TRB Committee has not been published. Therefore, minor details of the data are subject to change but the overall findings are valid.

## Surveys Sent and Responses Received (by MPO size)

<b>MPO Classification</b>	<b>Surveys Sent</b>	<b>Surveys Returned</b>	<b>Percent Returned</b>
Small (Population < 200k)	205	116	<b>57%</b>
Medium (Population >200k<1M)	133	74	<b>57%</b>
Large Population >1M	43	36	<b>84%</b>
Total	381	228	<b>60%</b>

# MPOs Providing Responses



# Model Characteristics

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- Majority of MPOs use 4-step process
- Few MPOs use tour-based methods
- Many MPOs omit mode choice
- Some MPOs do no travel forecasting

# Trip Generation

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- Unit of travel
  - “Total Person Trips” for midsize and large MPOs
  - “Vehicle trips” & “Total Person Trips” evenly split for small MPOs
- Trip generation model
  - Cross-classification for trip productions
  - Regression analysis for trip attractions

# Trip Distribution

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- Gravity Model dominant methodology
  - Distributes person trips
- Impedance
  - Mostly based on travel time over highway network.
  - Significant portion of large MPOs use function combining highway and transit times or other factors
- Less than 1/2 of reporting MPOs apply some type of adjustment factors
  - “K” factors
  - Time penalties
  - Some do not use “K” factors because they do not validate model results

## Mode Choice

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- Home-based work mode choice model
  - Used by 94% of large MPOs
  - 54% of mid-size MPOs
  - 21% of small MPOs
- Functional form overwhelmingly multinomial or nested logit.

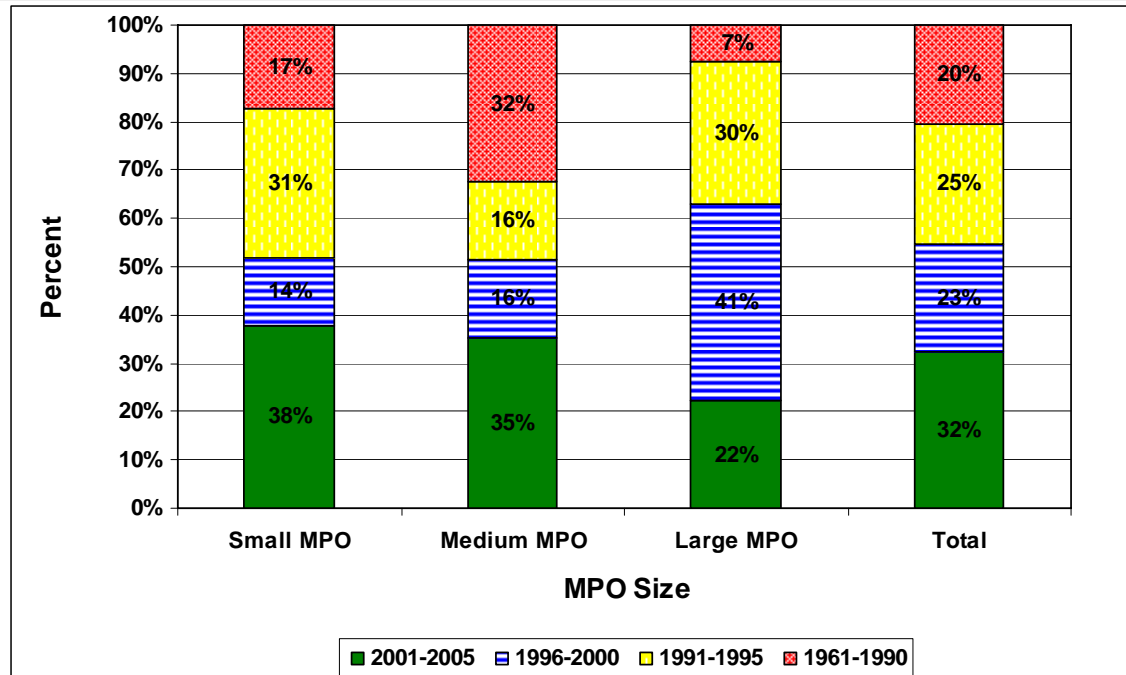
# Assignment

	<b>All MPOs</b>	<b>Large MPOs</b>
Equilibrium assignment of highway trips	76%	91%
Transit trips assigned	55%	94%
Post-processing for mobile source emissions	56%	97%

## Feedback of highway and transit times

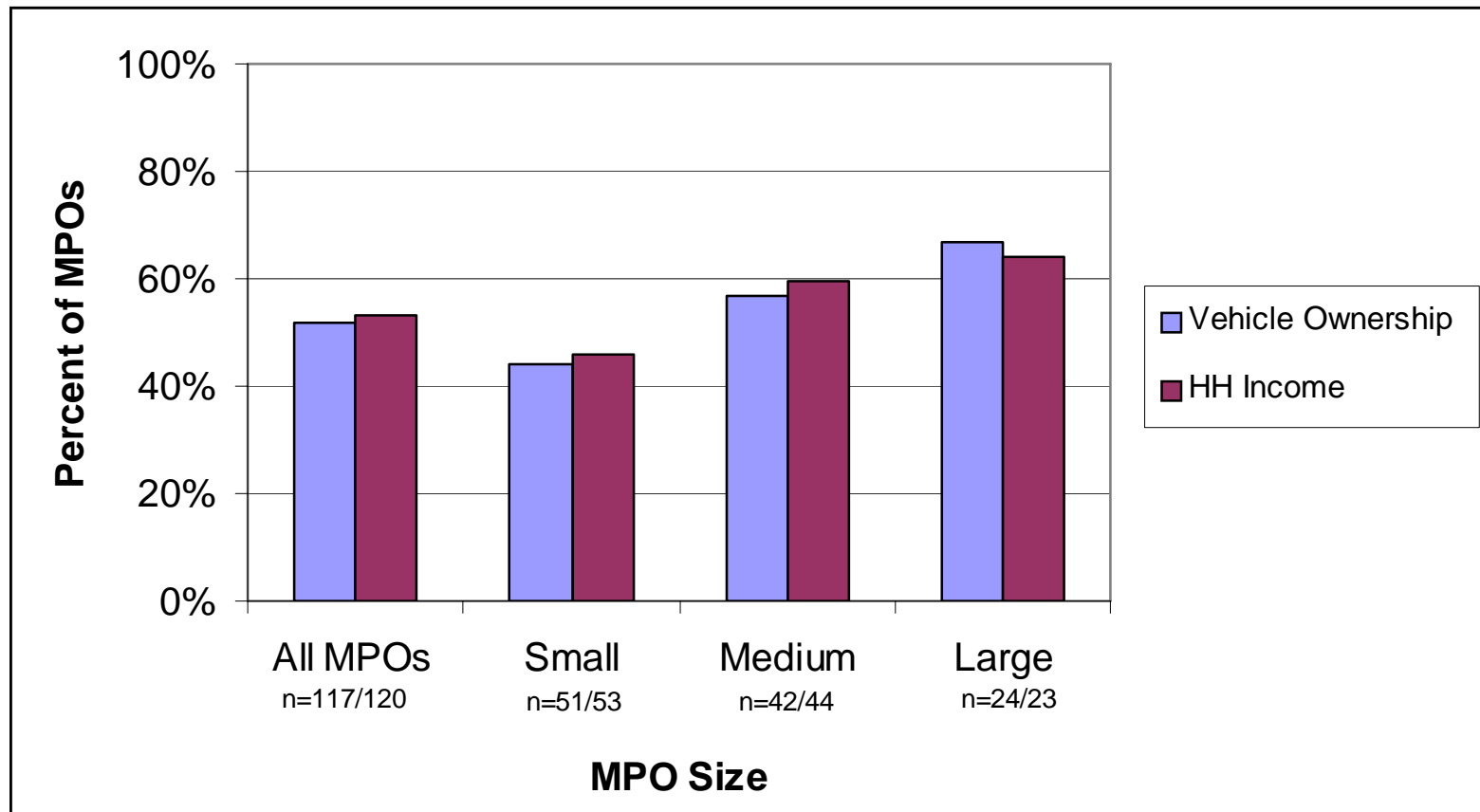
<b>Model Component</b>	<b>All MPOs</b>	<b>Large MPOs</b>
Auto ownership	16%	42%
Trip generation	16%	33%
Trip distribution	46%	88%
Mode choice	42%	85%
Land use	12%	41%

# D1. When was the last home interview survey conducted?



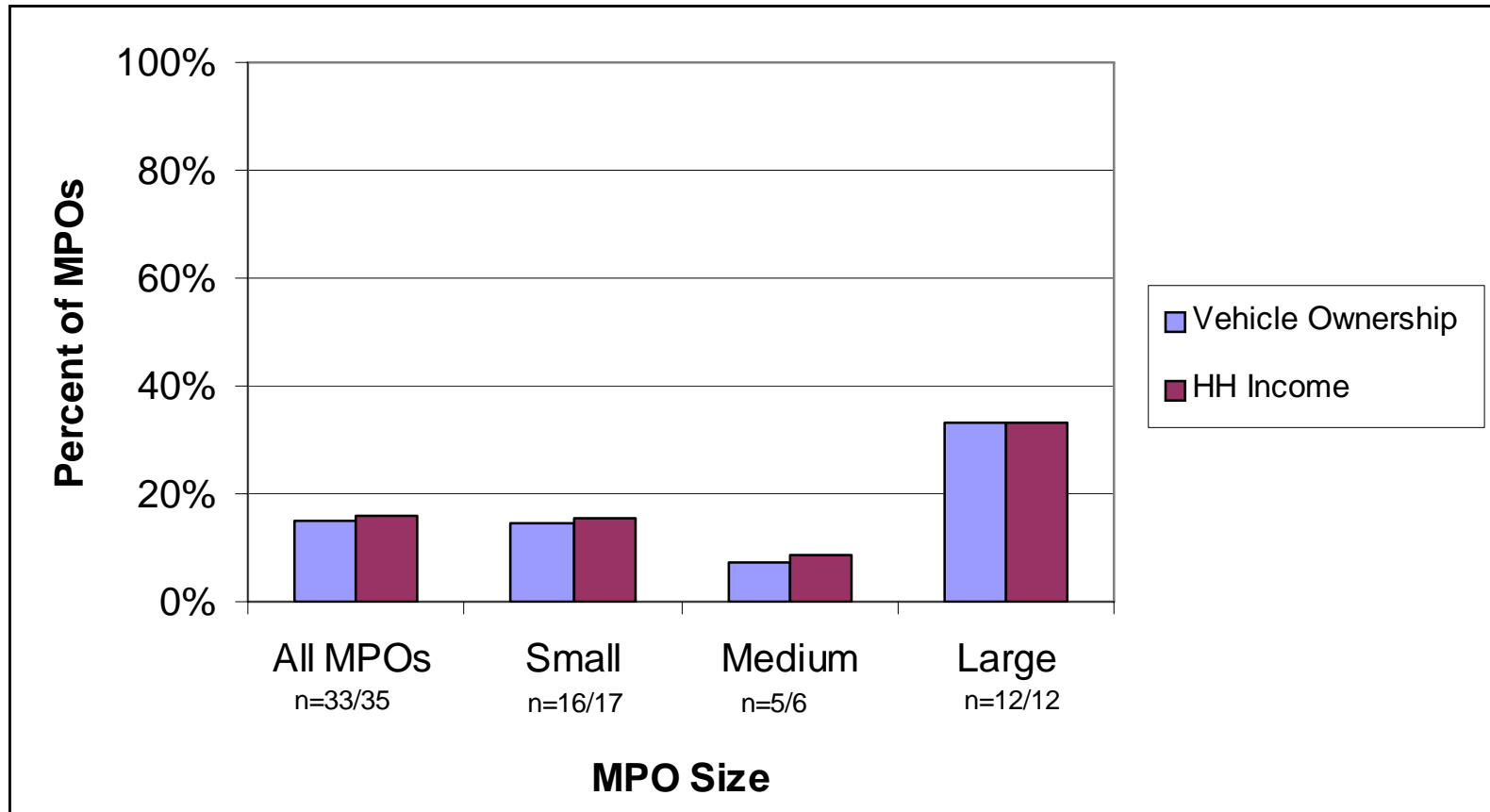
- Since 1991, 93 percent of large MPOs, compared with 80 percent of all MPOs, conducted a household travel survey.
- 22% of large MPOs conducted a household travel survey between 2001 and 2005, compared with 32 percent of all MPOs.
- 2/3 of large MPOs have conducted a survey since 1996.

## G1a. Are vehicle ownership and household income inputs to the modeling process (Trip Generation)?



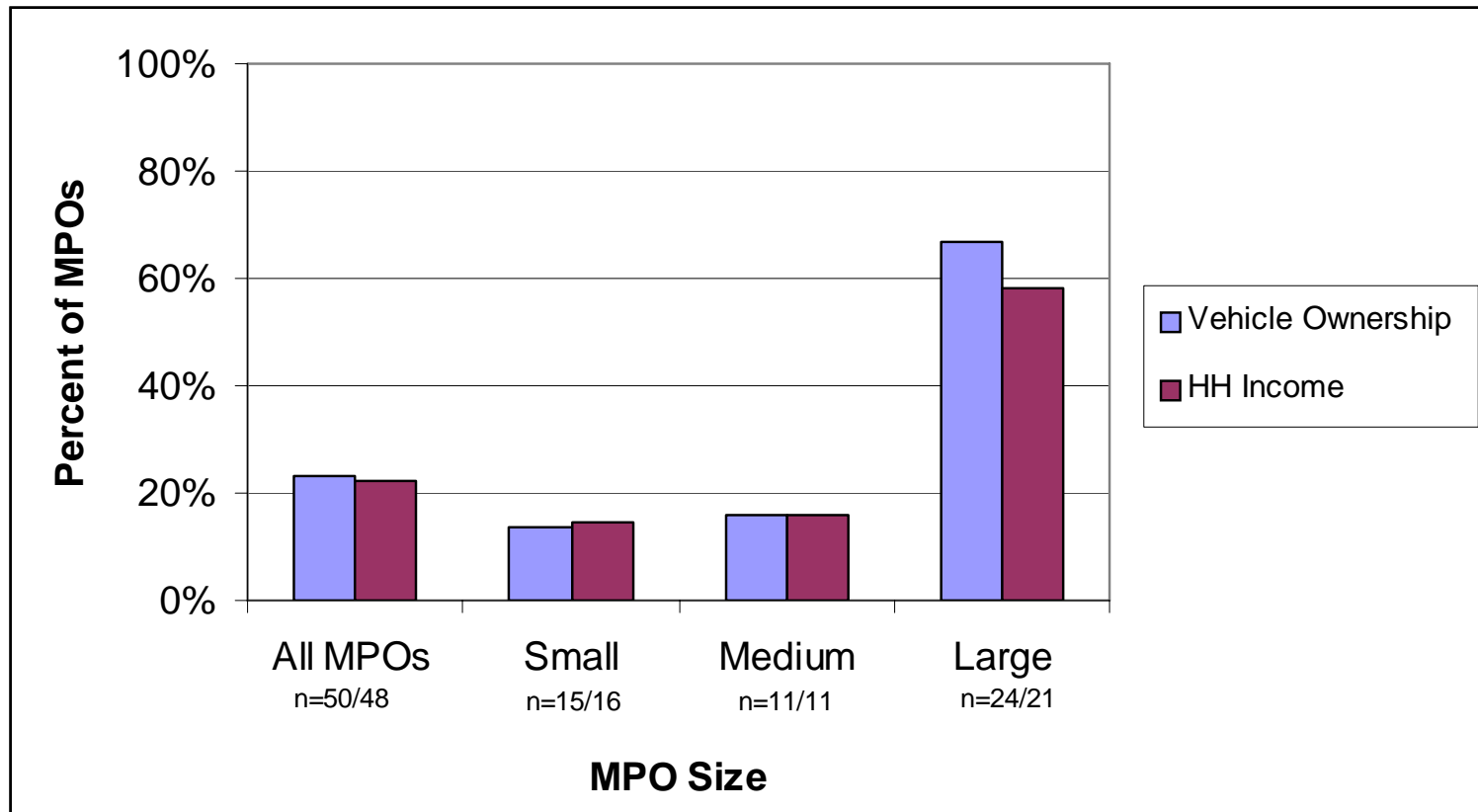
- Vehicle ownership and household income are included in over 60% of large MPO and over 40% of small MPO models

## G1b. Are vehicle ownership and household income inputs to the modeling process (Trip Distribution)?



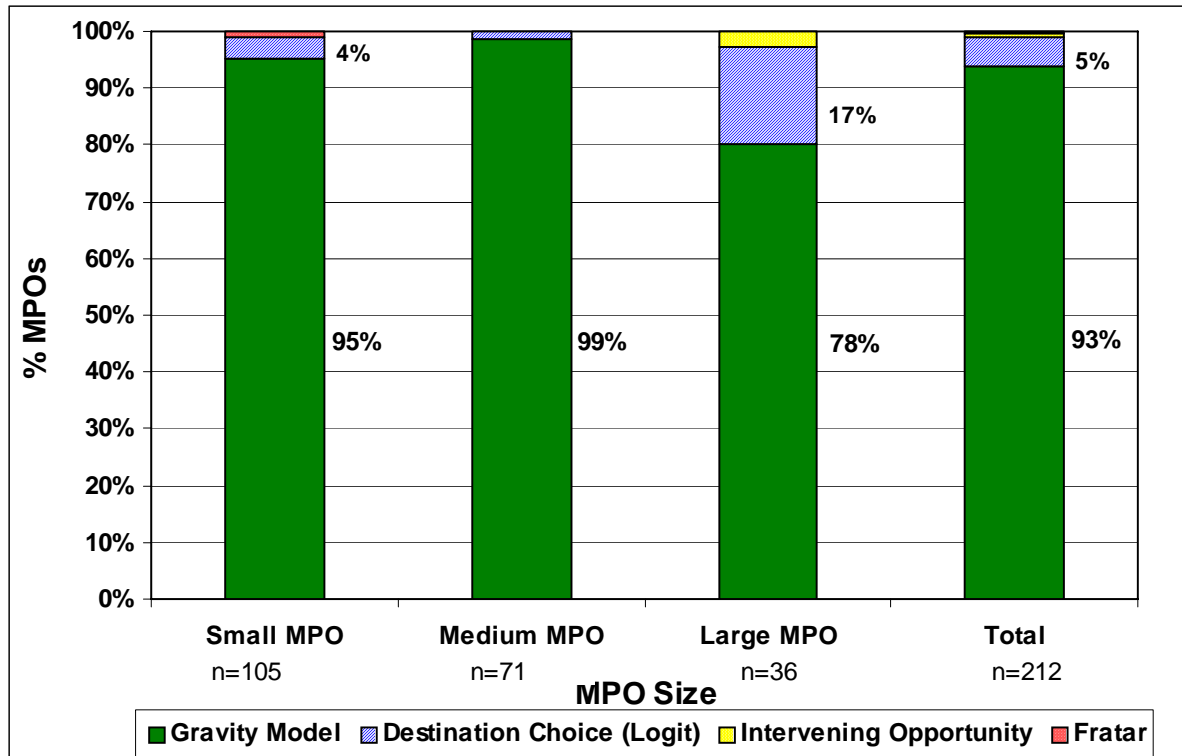
- Vehicle ownership and household income are inputs in over 30% of large MPO and only around 15% of small MPO models.

## G1c. Are vehicle ownership and household income inputs to the modeling process (Mode Choice)?



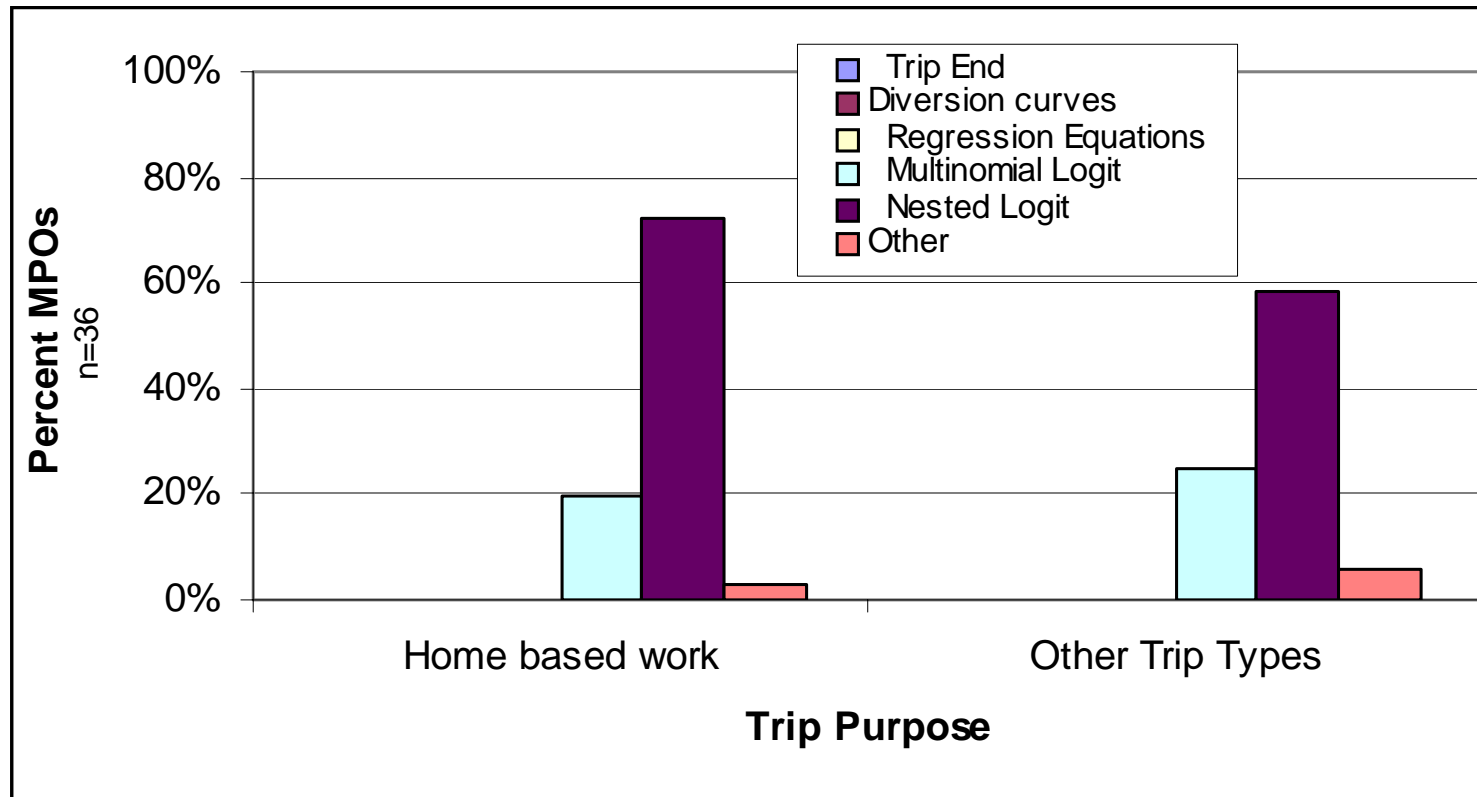
- Vehicle ownership and household income inputs are included in approximately 60% of large MPO and only about 15% of small MPO models.

# 11. What is the form of the trip distribution model? – Large MPOs



- The gravity model is used almost exclusively for modeling all trip purposes, except Home Based College/University and Work Based.
- Destination Choice (logit) models are used for Home Based Work (6 agencies), HB College/University (31%) and Work Based (30%) trips.

## J2. What is the form of the mode choice model? – Large MPOs



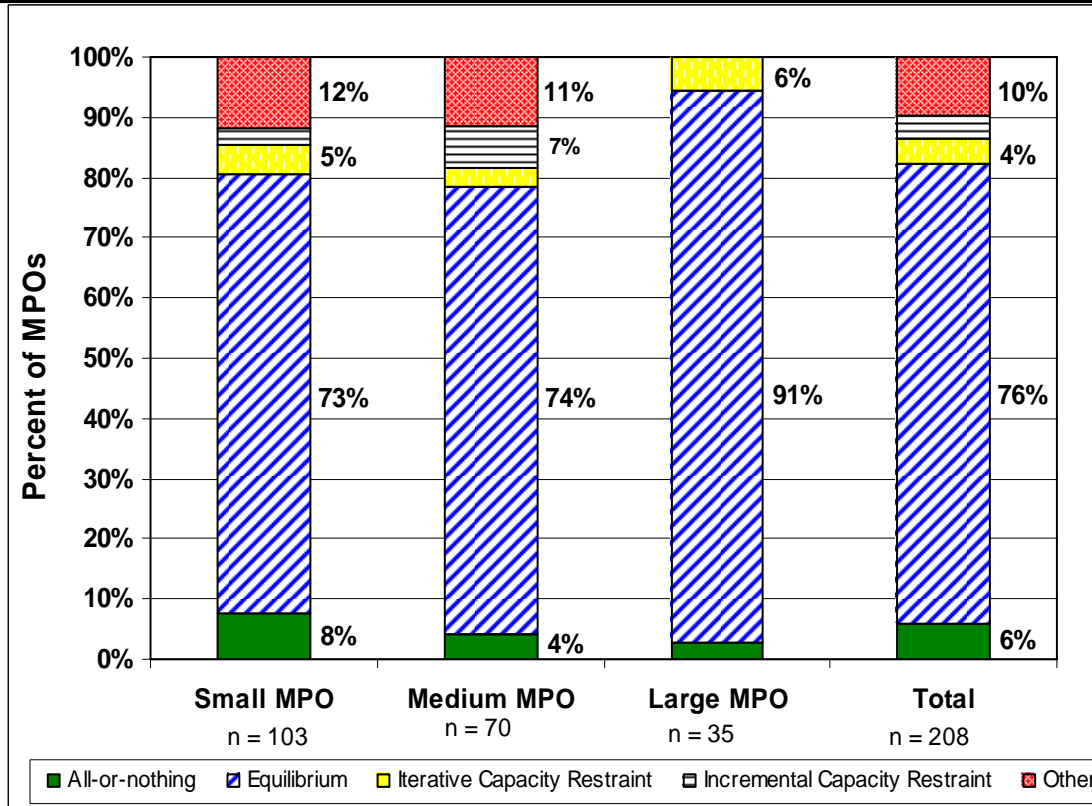
- 72% of large MPOs use nested logit models.

# J1. What transit modes are modeled? – Large MPOs

	Percent of Agencies	
	HBW	Other
Drive Alone	74%	68%
2 person auto	62%	50%
Local Bus	56%	56%
Walk to Local	53%	59%
Drive to Local	50%	47%
Express/commuter bus	44%	38%
3 or more person auto	38%	29%
Walk	38%	38%
Walk to Rail	35%	32%
Drive to Rail	35%	32%
LRT	35%	38%
Walk to Express	32%	29%
Drive to Express	32%	29%
Premium Transit (generic)	29%	26%
Commuter Rail	29%	29%
Transit (generic)	26%	29%
Bike	26%	26%
2 or more person auto	24%	12%
BRT	21%	24%
Auto (generic)	18%	15%
Auto Passenger	18%	24%
Walk to Premium	18%	24%
3 person auto	15%	9%
Drive to Premium	15%	18%
Drive to Other	15%	9%
Walk to Other	12%	9%
Heavy Rail	12%	12%
Other	9%	6%
4 person auto	6%	3%
4 or more person auto	6%	3%

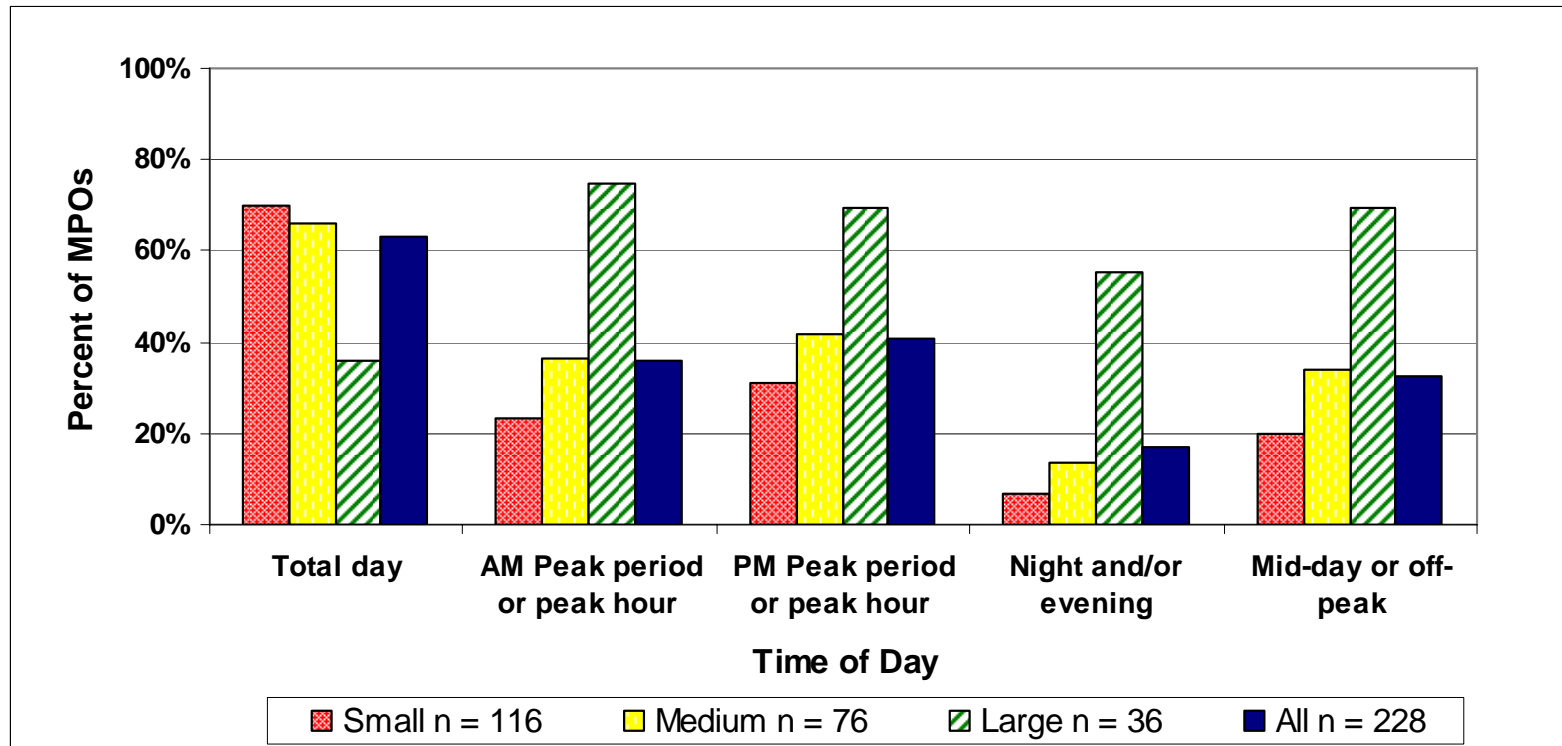
- Drive Alone, 2 person auto, and local bus are the most frequently included modes.
- Rail appears in about a third of the models, and where rail is used it is typically in a nested structure with walk-to-rail and drive-to-rail treated separately.
- Over 1/3 of the large MPOs claim to treat Walk as a separate mode and 26% list Bike as a mode used in their mode choice model.
- About one-third of the large MPOs report having a separate mode-of-access model.

# L1. Which method is used for traffic assignment?



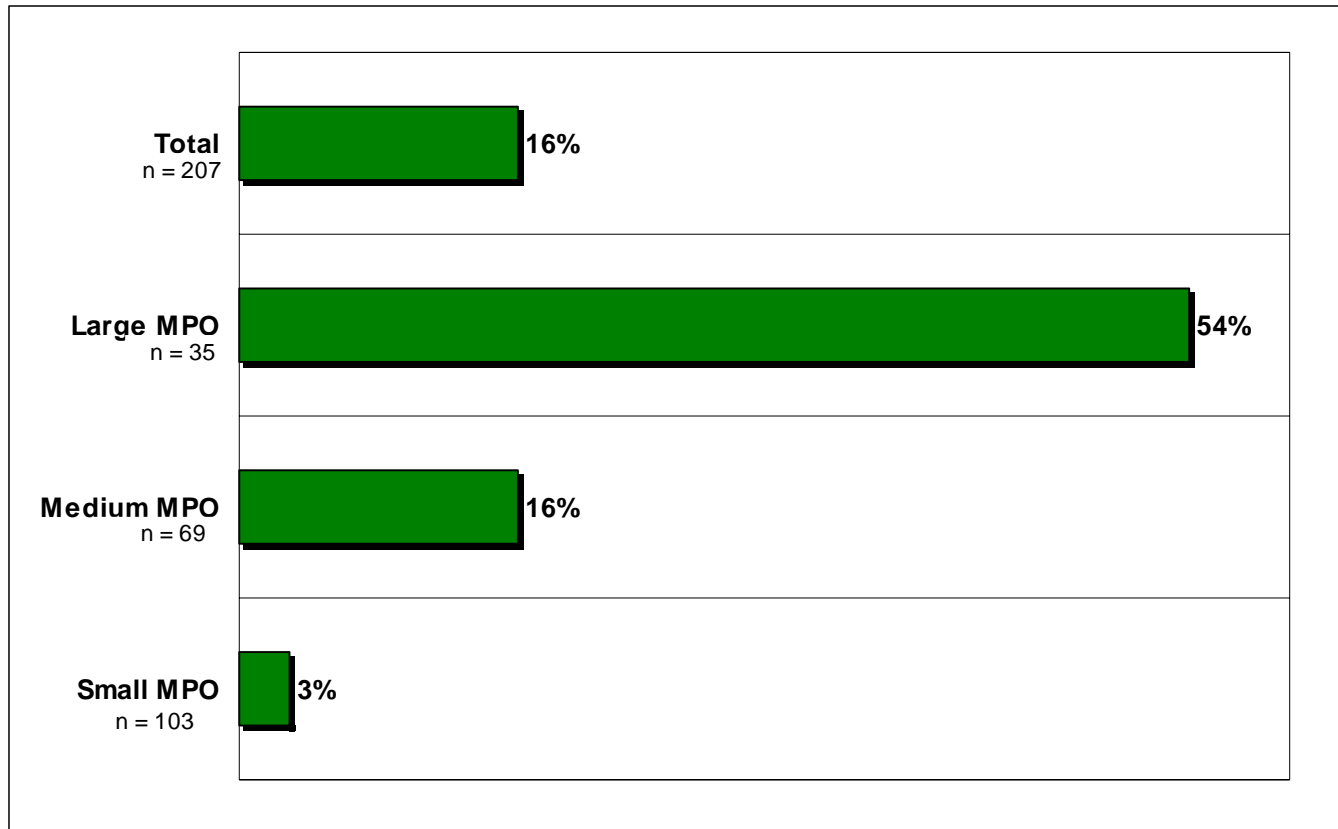
- Over 75% of all MPOs use Equilibrium assignment
- One large MPO uses all-or-nothing

# K1. What time of day characteristics are represented for traffic assignment?



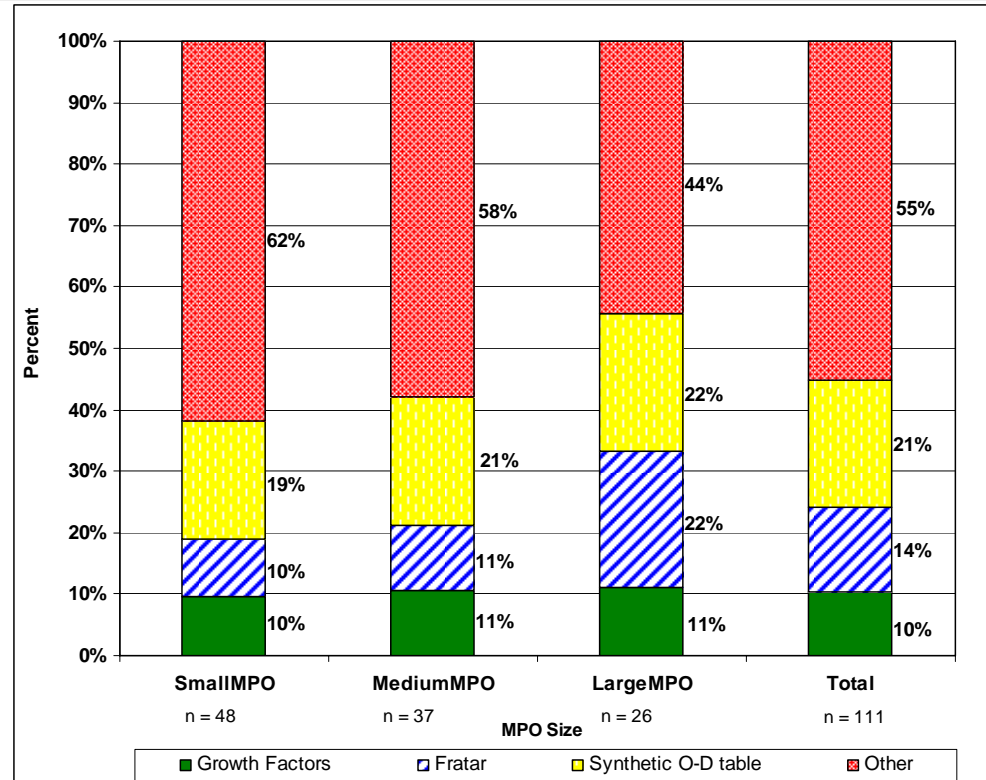
- About 60% of MPOs model the entire day for traffic assignment.
- Most large MPOs model by time of day (64%)

## T1. What percent of MPOs model non-motorized trips?



- 54% of large MPOs model non-motorized trips, compared with 16% overall.

## T2. How is freight movement modeled?



- About 20% of the agencies reporting used a synthetic trip table, about 25% use a factoring procedure.
- The remaining 55% report use of an “Other” method, generally a gravity model.

# Top Ten Best Features

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10. Multipath Transit Assignment
10. Detailed Operations Outputs
9. Accurate Land Use Data
8. Intersection Impedances
7. GIS Based
6. Multiplicity of Trip Purposes
5. Modes/Mode Choice Model
4. Standardized Model
3. Zone/Network Details
2. Well Calibrated and Validated
1. Ease of Use/Flexibility

# Top Ten Worst Features

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10. Lack of Tour Based Activity Model
9. No Mode Choice Model
8. Lack of Commercial Vehicle/Truck/Freight Modeling
7. Lack of Toll/HOT Lane Modeling
6. Lack of Recent Quality Calibration
5. Lack of Travel Survey Data
4. Lack of Time of Day
3. Trip Generation
2. Lack of Detail/Quality of Mode Choice in Model
1. Land Use Forecasting