

## **Trip Generation**

*KATS Travel Model Update*

# **Draft** Technical Memorandum 6

*prepared for*

**Kalamazoo Area Transportation Study**

*prepared by*

**Cambridge Systematics, Inc.**



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*technical memorandum 6*

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# 1.0 Introduction

Trip generation is the first phase of the traditional 4-step travel demand modeling process. It identifies the trip ends (productions and attractions) that correspond to the places where activities occur as represented by socioeconomic data (e.g., households, employment). Productions and attractions are estimated for each Traffic Analysis Zone (TAZ) by trip purpose, and then balanced at the regional level so that total productions and attractions are equal. In some cases, production and attraction allocation sub-models are applied to better represent the geographic distribution of trip-ends. The resulting productions and attractions by trip purpose and TAZ are subsequently used by the Trip Distribution model to estimate zone-to-zone travel patterns.

The trip generation model is defined such that trips are produced at home and are generally attracted to other places of activity (employment). The terms “productions” and “attractions” are the fundamental variables for defining the trip ends associated with travel. Productions generally occur at the home end of a trip; and attractions are typically associated with places of employment. Some exceptions are described in the following sections, but this method of defining productions and attractions is generally used for trips internal to the modeling area.



## 2.0 Trip Productions

Trip production rates represent the number of trips produced by each household in the modeling area. Productions for home-based trip purposes reflect trip-ends that occur at the household. For non home-based trips, trip productions occur at other non-home locations, but are first generated based on household data. This allows the model to reflect non home-based travel as a function of the total number of households in the region.

### 2.1 INCOME GROUP DEFINITIONS

The household survey asked participants to identify their income in one of 10 ranges. For travel model development, it is necessary to collapse these categories into a smaller number of groups based on survey availability, trip rate characteristics, and mode share characteristics.

Large increases in trip rates are seen at the \$20,000 and \$60,000 levels, suggesting that these would be a logical income group delimiters. Transit share is highest for households with incomes less than \$20,000, with minimal transit use observed for higher income households. After consideration of trip rates and mode shares, low, medium, medium-high, and high income groups were identified as shown below in Table 2.1.

**Table 2.1 Trip Rates by Income Range**

Income Range	Total Trips per Household	HBW Trips per Household	Transit Share	Income Group
Less than \$10k	7.44	0.44	9.5%	Low
\$10k to \$20k	5.73	0.53	10.3%	
\$20k to \$30k	9.10	1.24	0%	Medium
\$30k to \$40k	7.20	1.53	0%	
\$40k to \$50k	12.18	1.41	0%	
\$50k to \$60k	11.85	1.33	0%	
\$60k to \$75k	15.75	1.86	0.9%	High
\$75k to \$100k	12.24	2.34	0%	
\$100k to \$125k	13.89	2.39	0%	
\$125k or more	10.00	1.91	0%	
<b>All Income Groups</b>	<b>10.58</b>	<b>1.49</b>	<b>1.2%</b>	

Notes: Information is for households within the KATS modeling area. Records with missing or partial income or data are not included in this table. Incomes are in 2005 dollars. Income group definitions using 2012 ACS data are slightly different, as described further in section 7.3.

## 2.2 CROSS CLASSIFIED PRODUCTION RATES

The KATS Model uses a cross-classified trip production model, which computes trip production rates for each trip purpose based on household attributes. Examples include trip rates that vary by household income group and size, or by household income and number of autos. Based on a review of MDOT's Urban Model Improvement Program (UMIP) documents, past experience, and discussions with KATS and MDOT staff, the set of trip rate variables has been defined as shown below.

- Work Related Trips (HBW and WBO): Household income and number of workers
- Other non-university trips (HBS, HBO, and OBO): Household income and size

School (K-12) and university trip productions are discussed separately in the school and university section of this memorandum.

Cross classified trip rates are computed as the mean number of trips per household for each combination of classification variables. However, sufficient data were not when limiting the analysis to the 324 households within the KATS modeling area. Therefore, trip production analysis was conducting using 4,336 household samples in the KATS area and from similar communities within the state of Michigan. Because records outside of the KATS area have not been through a rigorous weighting and expansion process, un-weighted data were used for production rate analysis. This is acceptable because both the numerator (number of trips) and denominator (number of households) in the production rate calculation are derived directly from the household survey.

Cross classified trip rates were developed through a review of mean trip rates along with household sample sizes and expected trip rate patterns. As a result, some individual combinations with small sample sizes and similar trip rates were grouped together to determine a group trip production rate. The resulting trip production rates are shown in Tables 2.2 through 2.6, with grouped trip rates identified with background shading. Total triprates are shown in Table 2.7. Since these trip rates all include an income classification, households with missing or limited income information were excluded from analysis.

Underrepresentation of trip making is common in travel surveys due to under-reporting by survey participants. Experience with household travel surveys conducted in other areas that provided a subset of participants with GPS responders has shown that commute tend to be most accurately reported, while other trips are more likely to be omitted. During model validation, trip rate factors **will be** developed based on a review of modeled volumes as compared

traffic count data. The resulting trip rate factors will be shown along with resulting overall trip rates in Table 2.8.

**Table 2.2 HBW Trip Production Rates**

Income Group	0 Workers	1 Worker	2 Workers	3+ Workers	All Worker Groups
Low Income	0.00	0.94	2.13	2.63	1.30
Medium Income	0.00	1.26	2.47	4.00	2.18
High Income	0.00	1.45	2.54	3.78	2.53
All Incomes	0.00	1.29	2.51	3.84	1.51

**Table 2.3 HBS Trip Production Rates**

Income Group	1 Person	2 People	3 People	4 People	5+ People	All Sizes
Low Income	0.44	0.83	0.64	0.99	1.07	0.61
Medium Income	0.47	0.86	0.88	0.99	1.07	0.78
High Income	0.47	0.86	0.88	0.99	1.15	0.90
All Incomes	0.46	0.86	0.86	0.99	1.11	1.07

**Table 2.4 HBO Trip Production Rates**

Income Group	1 Person	2 People	3 People	4 People	5+ People	All Sizes
Low Income	1.19	1.84	3.43	4.05	4.08	1.87
Medium Income	1.28	2.56	3.46	5.06	6.27	2.95
High Income	1.28	2.56	3.46	5.29	7.15	3.80
All Incomes	1.25	2.50	3.46	5.14	6.64	4.16

**Table 2.5 WBO Trip Production Rates**

Income Group	0 Workers	1 Worker	2 Workers	3+ Workers	All Worker Groups
Low Income	0.00	0.59	0.61	1.00	0.61
Medium Income	0.00	0.82	1.35	1.60	1.11
High Income	0.00	0.84	1.88	2.39	1.77
All Incomes	0.00	0.80	1.70	2.13	0.95

**Table 2.6 OBO Trip Production Rates**

Income Group	1 Person	2 People	3 People	4 People	5+ People	All Sizes
Low Income	0.76	1.46	2.13	2.86	3.92	1.33
Medium Income	0.85	1.91	2.61	3.54	5.11	2.18
High Income	0.85	1.91	2.61	4.06	5.51	2.87
All Incomes	0.82	1.87	2.56	3.81	5.25	3.09

**Table 2.7 Trip Production Rate Summary**

Income Group	HBW	HBS	HBO	WBO	OBO	Home-Based	
						Total	Total
Low Income	1.30	0.61	1.87	0.61	1.33	3.78	5.71
Medium Income	2.18	0.78	2.95	1.11	2.18	5.92	9.20
High Income	2.53	0.90	3.80	1.77	2.87	7.22	11.86
All Incomes	1.51	1.07	4.16	0.95	3.09	6.74	10.77

**Table 2.8 Trip Rate Factors**

Trip Rate	Factor	Adjusted Trip Rate
HBW		
HBS		
HBO		
WBO		To be determined
OBO		
Home-Based Total		
Overall Total		



## 3.0 Trip Attractions

Attraction rates define the ends of trips that occur at locations other than the trip-maker's home. For home-based trips, the attraction end of a trip occurs at a non-residential location, or occasionally at another person's home. For WBO trips, trip productions occur at the trip maker's workplace and the trip attraction occurs at the non-work end of the trip. For OBO trips, the trip production and attraction are synonymous with trip origin and destination. For non-home-based trip purposes, allocation models and special procedures are used to properly locate the production and attraction end of each trip.

### 3.1 ATTRACTION VARIABLES

Trip attractions are computed based on employment by type, along with total households. Household variables such as income, size, and number of workers are not considered in the trip attraction models because only a small portion of trip attractions occur at households. TAZ household totals were obtained from the US Census, with employment data obtained from Claritas and Hoovers. Employment data were categorized into four employment types using the correspondence shown in Table 3.1.

**Table 3.1 NAICS Code to Employment Type Correspondence**

Two-Digit NAICS Code	Industry Description	Model Employment Type
11	Agriculture, Forestry, Fishing & Hunting	Basic
21	Mining, Quarrying, and Oil and Gas Extraction	Basic
22	Utilities	Basic
23	Construction	Basic
31	Manufacturing	Basic
32	Manufacturing	Basic
33	Manufacturing	Basic
42	Wholesale Trade	Basic
44	Retail	Retail
45	Retail	Retail
48	Transportation and Warehousing	Basic
49	Transportation and Warehousing	Basic (1)
51	Information	Service

52	Finance and Insurance	Service
53	Real Estate and Rental and Leasing	Service
54	Professional, Scientific, and Technical Services	Service
55	Management of Companies and Enterprises	Service
56	Administrative and Support and Waste Management and Remediation Services	Service
61	Educational Services	Service
62	Health Care and Social Assistance	Medical (2)
71	Arts, Entertainment, and Recreation	Service
72	Accommodation and Food Services	Service (3)
81	Other Services (except Public Administration)	Service
92	Public Administration	Service

Notes: (1) NAICS code 491 – Postal Service is included in service instead of basic.  
 (2) NAICS code 624 – Social Assistance is included in service instead of medical.  
 (3) NAICS code 722 – Food Service is included in retail instead of service.

### 3.2 CLASSIFIED ATTRACTION RATES

Trip attraction rates were developed using a classification model, which divides the total number of expanded and weighted tip attractions from the household survey by an attraction variable. This approach requires identification of a land use variable (i.e., either employment type or household) for each trip attraction in the household survey. While an initial attempt was also made to estimate trip attraction rates using a regression model, it was determined that the sample size within the KATS modeling area was not large enough to facilitate this approach.

Each surveyed trip attraction was matched to a specific attraction variable based on the location type reported in the MI Travel Counts dataset using the correspondence shown in Appendix A. A tabulation of weighted and expanded trips by attraction variable is shown along with total employment and households in Table 3.2. This information was used to calculate the initial set of trip attraction rates shown in Table 3.3.

This section will include text about selection/modification of trip rates, with final values in Table 3.4. Note that employment values and trips rates will change.

In model application, trip rate factors discussed above are applied to both trip productions and trip attractions.

**Table 3.2 Trips by Attraction Rate Variable**

<b>Attraction Variable</b>	<b>HBW</b>	<b>HBS</b>	<b>HBO</b>	<b>WBO</b>	<b>OBO</b>	<b>Total Attractions</b>	<b>SED Total</b>
Retail	26,077	71,649	89,446	45,684	91,972	45,684	34,997
Service	46,466	0	116,403	30,979	49,566	30,979	78,666
Medical	17,090	0	30,964	6,071	8,351	6,071	24,515
Basic	42,610	695	3,984	4,009	3,755	4,009	49,968
Households	3,012	1,581	58,742	8,180	39,493	8,180	
<b>Total Attractions</b>	<b>135,256</b>	<b>73,925</b>	<b>299,539</b>	<b>94,923</b>	<b>193,136</b>	<b>94,923</b>	

**Table 3.3: Raw Trip Attraction Rates**

	<b>HBW</b>	<b>HBS</b>	<b>HBO</b>	<b>WBO</b>	<b>OBO</b>	<b>All Purposes</b>
Retail	0.75	2.05	2.56	1.31	2.63	<b>9.28</b>
Service	0.59	0	1.48	0.39	0.63	<b>3.09</b>
Medical	0.70	0	1.26	0.25	0.34	<b>2.55</b>
Service & Medical	0.62	0	1.43	0.36	0.56	<b>2.96</b>
Basic	0.85	0.01	0.08	0.08	0.08	<b>1.10</b>
Households	0.03	0.01	0.53	0.07	0.36	<b>1.00</b>
<b>All Employees</b>	<b>0.70</b>	<b>0.38</b>	<b>1.28</b>	<b>0.46</b>	<b>0.82</b>	<b>3.64</b>

**Table 3.4: Model Trip Attraction Rates**

<b>Employment</b>	<b>HBW</b>	<b>HBS</b>	<b>HBO</b>	<b>WBO</b>	<b>OBO</b>	<b>All Purposes</b>
Retail						
Service						
Medical						<b>To Be determined</b>
Basic						
Households						



## 4.0 Non Home Based Production Allocation

While WBO and OBO trips are initially generated using household-based production rates, these trip productions primarily occur at places of employment. The total number of WBO and OBO productions generated at households is retained as a control total for trip balancing, but production allocation rates are used to move non-home-based productions to the appropriate work locations. For WBO trips, trip productions are defined as the work trip end and attractions are defined as the non-work trip end. To accommodate this, a set of WBO production allocation rates were developed using the classification analysis described above. Resulting WBO production allocation rates are shown in Table 4.1.

A simpler approach was taken for OBO trips. OBO production allocation rates are identical to OBO attraction rates. This approach is possible because there is no distinct difference between OBO productions and attractions. OBO productions and attractions all occur at non-home, non-work locations.

**Table 4.1: WBO Production Allocation Rates**

Employment	WBO Production Allocation Rate
Retail	1.31
Service	0.39
Medical	0.12
Basic	0.16
All Employees	1.98



## 5.0 School and University Trips

The cross classified trip rates described above account for most travel, but do not include K-12 school trips or trips to traditional 4-year universities. Trips to community colleges and vocational schools are included in the HBO trip purpose. Separate models were developed for the K-12 and university trip purposes.

### 5.1 K-12 SCHOOL TRIPS

Home Based School (HBSc) trips are defined as trips by students between home and a school at which the student is enrolled. HBSc trips do not include trips by parents, guardians, or others traveling from home to a school; such trips are included in the HBO trip purpose. Trips between school and a non-home location are included in the WBO or OBO trip purposes, even for school students.

#### HBSc Production Rates

HBSc trip productions were analyzed in a manner similar to other home-based trip production rates, but were considered using a classification based on the number of children under the age of 18 in a household. Children per household is a variable present in the household survey data, and is also available at the block level from the Census. Trip production rates by number of children is shown in Table 5.1.

**Table 5.1: HBSc Production Rates by Number of Children**

	0	1	2	3	4+	All Households
Total	0	1.24	2.39	3.38	4.89	0.78
Per Child	0	1.24	1.20	1.13	1.22	1.19

The data show that, aside from slight variations, the home-based school trips are produced at a rate of 1.19 trips per child. There is little reason to believe that the number of children varies the production, so the rates have been simplified to a single value. This approach also eliminates the need to compute a distribution of households by number of children, instead requiring only a total number of children to be calculated. Average children per household is maintained at the TAZ level and is multiplied by total households to determine the number of children in each zone.

### **HBSc Attraction Rates**

School trip attraction rates are computed as the total number of weighted and expanded HBSc trips from the household survey, divided by the total school enrollment for the region. This calculation results in a HBSc attraction rate of 1.77 trips per enrolled student.

## **5.2 UNIVERISTY TRIPS**

This is pending while we process data from WMU.



## 6.0 Trip Balancing

Trip productions and attractions were estimated separately by purpose using the trip rates and allocation models previously described. Because the production and attraction models are developed independently, the total number of productions and attractions may not always be identical. The trip balancing process reconciles any differences in production and attraction totals, ensuring conservation of trips in the model.

Balancing depends on the level of confidence associated with the initial estimate of productions and attractions. Since household survey data was used to estimate trip production rates, and US Census based household data is considered more reliable than the employment data, trip totals for all trip purposes are balanced to productions.



## 7.0 Disaggregation Models

The model input data includes information about the number of households in each TAZ, along with average household size, average number of workers, median income, and average number of children per household for each TAZ as obtained from US Census and ACS data. The model uses household disaggregation models to estimate the univariate distribution of households by size, number of workers, and by income group for each TAZ. Once these distributions have been estimated, the model uses an iterative proportional factoring process to develop bivariate distributions of households by income and size and by income and number of workers for each TAZ.

Household disaggregation models use known variables to establish a distribution of households by classification. For example, a zone with an average household size of 1 person would be comprised entirely of 1-person households. Conversely, a zone with an average household size of 4 people would be modeled as a combination of 1, 2, 3, 4, and 5+ person households. Distributions are represented by hand-fitted curves based on US Census and ACS data.

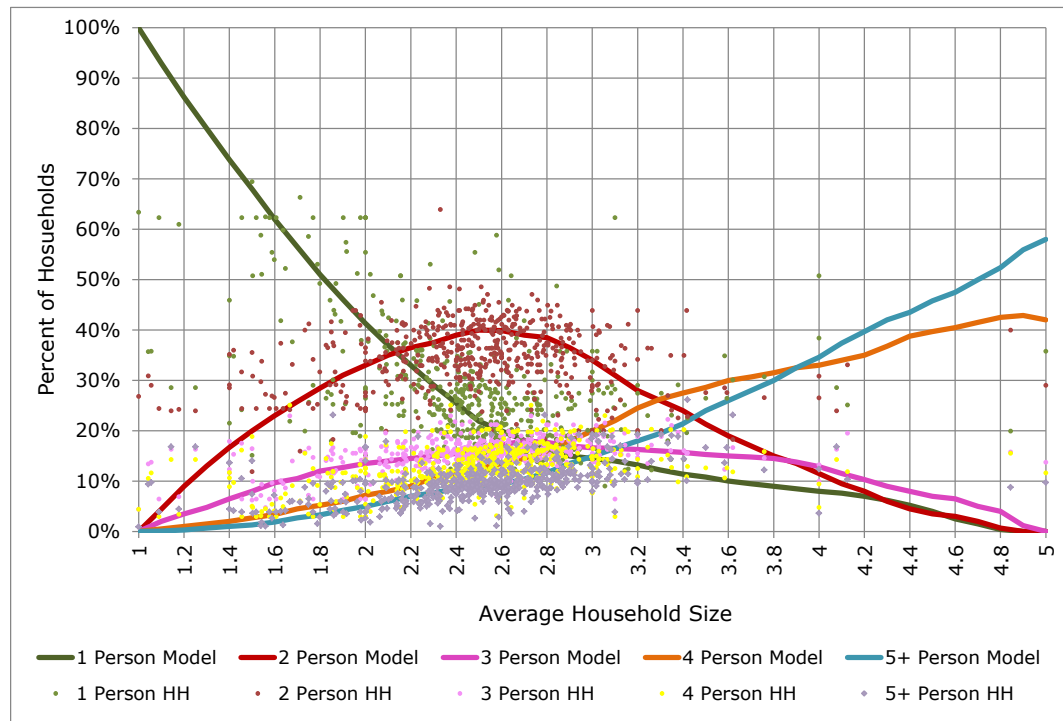
The distribution curves must always sum to 100%. For the household size and worker models, the results must be consistent with the input value when averaged. Hand-fitted curves have been adjusted to fit the observed data points, sum to 100%, and produce the appropriate averages.

The household income model is expressed as a percentage of regional income rather than an income value in dollars to allow median income data to be expressed in any unit, so long as the units are consistent for all zones. Data may be input in 2010 dollars, or in some other unit if desired. The KATS Model has been implemented using 2010 dollars.

### 7.1 HOUSEHOLD SIZE DISAGGREGATION MODEL

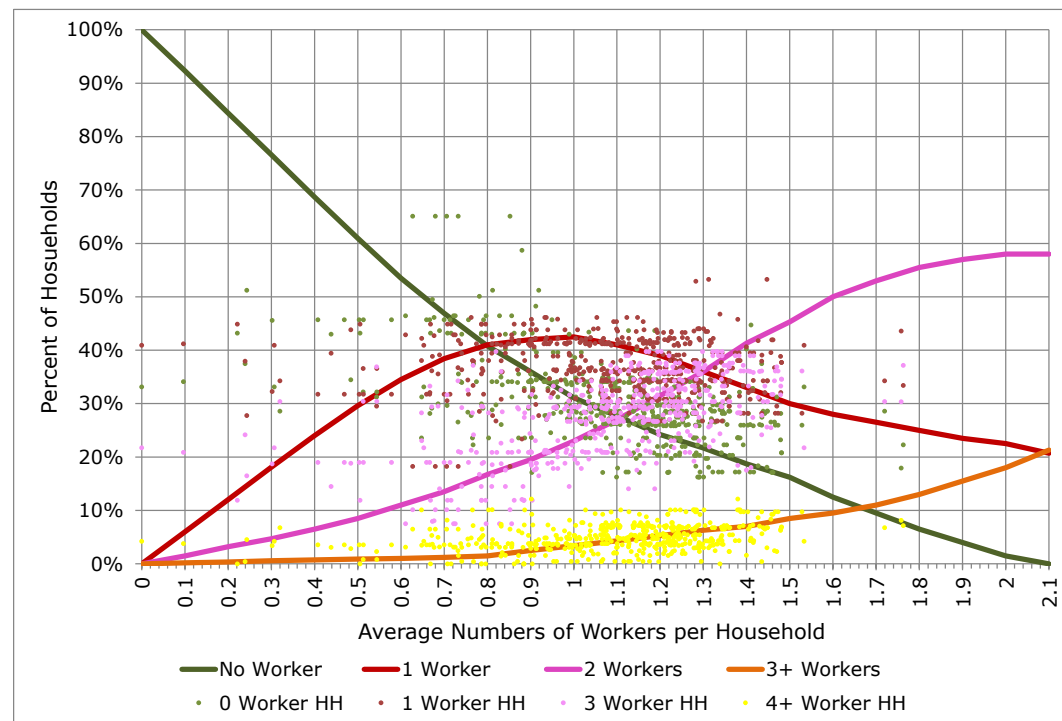
Model trip rates are classified by five household size groups. The portion of households in each group can be approximated for any given TAZ based on the average household size. Disaggregation curves are shown along with Census data in Figure 7.1.

**Figure 7.1: Household Size Disaggregation Model**



## 7.2 HOUSEHOLD WORKER DISAGGREGATION MODEL

The household number of workers model was developed in a manner similar to the household size disaggregation model. Worker information was obtained from the ACS dataset rather than the US Census, and is available at the block group level rather than the block level. Distributions were applied to TAZs based on the household total from the Census block level along with worker data from the block group layer. Disaggregation curves are shown along with ACS data in Figure 7.3.

**Figure 7.2 Household Worker Disaggregation Model**

### 7.3 HOUSEHOLD INCOME DISAGGREGATION MODEL

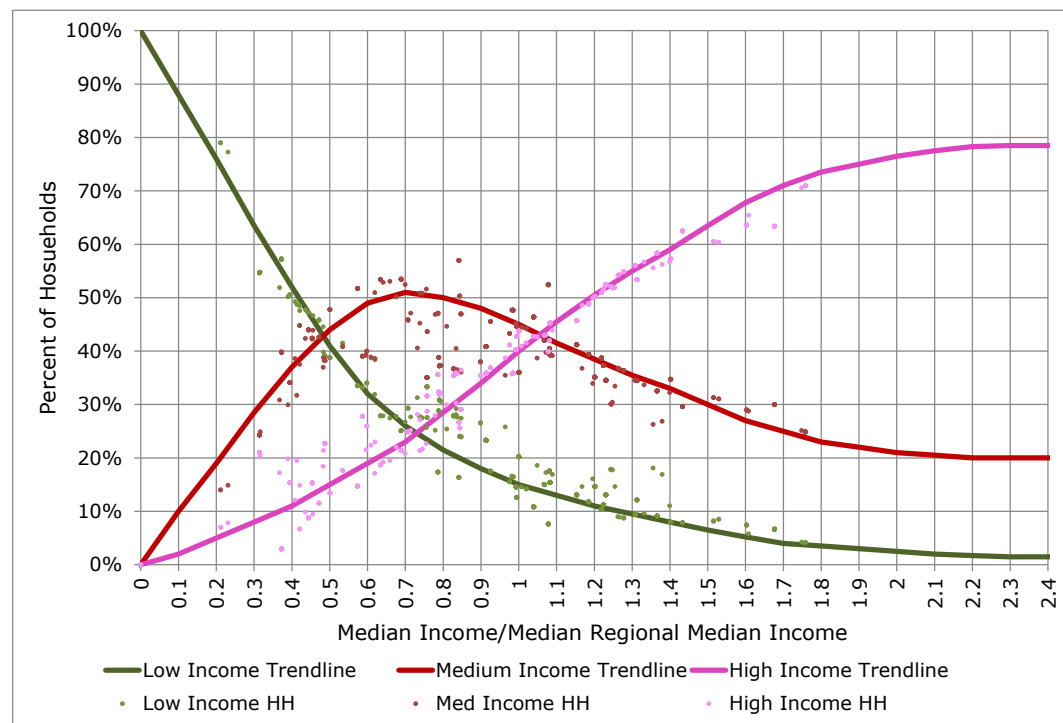
The household income group model was developed in a manner similar to the size and worker disaggregation models, but is based on each TAZ's median income as a share of the regional median. Income data was obtained from the ACS at the tract level. Low, medium, medium-high, and high income group definitions are repeated in Figure 7.1 for reference. Disaggregation curves are shown along with Census data in Figure 7.33.

For the 2010 base year model, ACS income groups are specified in 2012 dollars, while household survey data and the resulting trip rates are specified in 2005 dollars. To account for this discrepancy, different income group definitions could be used for survey analysis and for model application using ACS-based income data. Table 7.1 shows the 2005 income ranges alongside 2012 CPI adjusted income ranges. For the low income group, the inflation adjusted value is identical to the 2005 value when rounded to the closest available income group cutpoint. The cutpoint between the medium and high income is rounded up to \$75,000 dollars when applying the model using 2012 dollars.

**Table 7.1: Income Group Definitions**

Income Group	Income Range (2005 dollars)	Income Range (CPI Adjusted from 2005 to 2012 dollars)	Income Range (2012 Dollars)
Low	\$0 – 19,999	\$0 - \$23,599	\$0 – 19,999
Medium	\$20,000 – 59,999	\$23,600 - \$70,799	\$20,000 – 74,999
High	\$60,000 and above	\$70,800 and above	\$75,000 and above

**Figure 7.3: Household Income Disaggregation Model**



## 7.4 TAZ-LEVEL BIVARIATE DATA

The household income, worker, and size disaggregation models produce individual distributions, but do not produce joint (i.e., bivariate) distributions. To apply trip production rates that simultaneously vary by two variables, bivariate household data (separately by income/size and income/workers) is required for each TAZ. Bivariate distributions of households by TAZ are created by starting with the appropriate regional bivariate distribution of households. The regional distributions are adjusted for each TAZ using an IPF process to match the univariate distributions resulting from disaggregation models. During this process, the regional totals are constrained to match the observed regional bivariate distributions. The regional bivariate distribution of households by size and income is shown in Table 7.2, with the regional distribution by income and

number of workers shown in Table 7.3. These regional distributions were obtained from the 2008-2012 Public Use Micro Sample (PUMS) dataset, which contains data from ACS. Because the PUMS data is only available for large geographic areas called Public Use Microata Areas (PUMAs), the bivariate distributions are shown for the entirety of both Kalamazoo and Van Buren Counties.

**Table 7.2: Bivariate Household Distribution, Household Size**

HH Size	Low Income (\$0 - 20k)	Middle Income (\$20 - 60k)	High Income (\$60k +)	All Incomes
1-Person	12%	13%	4%	29%
2-Person	5%	16%	14%	35%
3-Person	2%	5%	7%	14%
4-Person	1%	5%	7%	13%
5-Person +	1%	3%	4%	8%
All Sizes	22%	43%	36%	100%

Source: 2008-2012 PUMS Data for PUMAs 02601 and 02602.

**Table 7.3: Bivariate Household Distribution, Household Workers**

HH Workers	Low Income (\$0 - 20k)	Middle Income (\$20 - 60k)	High Income (\$60k +)	All Incomes
0-Worker	7%	7%	1%	16%
1-Workers	11%	18%	8%	37%
2-Workers	3%	14%	21%	37%
3-Workers +	1%	3%	6%	10%
All Worker Categories	22%	43%	36%	100%

Source: 2008-2012 PUMS Data for PUMAs 02601 and 02602.



# A. Survey / Employment Correspondence

**Table A.1 Survey Location Type to Employment Type Correspondence**

ID	Location Type Description	Employment Category
1	Residential	Household
2	Automotive Dealer/Repair	Service
3	Bank/Financial Institution (Unknown)	Service
4	Barber/Beauty/Nail Salon (Unknown)	Service
5	Bookstore/Library/Newsstand (Unknown)	Retail
6	Construction Site	Basic
7	Convenience/Drug Store (Unknown)	Retail
8	Daycare Facility/Preschool/Nursery School	Service
9	Gas Station	Retail
10	Government/Municipal/City Offices	Service
11	Grocery	Retail
12	Hotel/Motel/Other Lodging Facility	Service
13	Indoor Recreation (Unknown)	Service
14	Industrial Site	Basic
15	Medical Facility/Hospital	Medical
16	Movie Theater/Theatre/Concert Venue/Sports Arena (Unknown)	Retail
17	Museum/Zoo/Historic Site	Retail
18	Office Building	Service
19	Outdoor Recreation	Retail
20	Religious - Church Synagogue/Houses of Worship	Service
21	Restaurant/Fast Food/Bar & Grill (Unknown)	Retail
22	School - K-12	Service
23	School - College/University/Technical/Vocational	Service
24	Shopping Mall/Department Store (Unknown)	Retail
25	Transportation Terminal (airport, train, bus)	Service
26	Bank/Financial Institution (Enclosed Mall)	Service
27	Bank/Financial Institution (Standalone or Strip Mall)	Service

ID	Location Type Description	Employment Category
28	Barber/Beauty/Nail Salon (Enclosed Mall)	Service
29	Barber/Beauty/Nail Salon (Standalone or Strip Mall)	Service
30	Bookstore/Library/Newsstand (Enclosed Mall)	Retail
31	Bookstore/Library/Newsstand (Standalone or Strip Mall)	Retail
32	Convenience/Drug Store (Enclosed Mall)	Retail
33	Convenience/Drug Store (Standalone or Strip Mall)	Retail
34	Indoor Recreation (Enclosed Mall)	Retail
35	Indoor Recreation (Standalone or Strip Mall)	Retail
36	Movie Theater/Theatre/Concert Venue/Sports Arena (Enclosed Mall)	Retail
37	Movie Theater/Theatre/Concert Venue/Sports Arena (Standalone or Strip Mall)	Retail
38	Restaurant/Fast Food/Bar & Grill (Enclosed Mall)	Retail
39	Restaurant/Fast Food/Bar & Grill (Standalone or Strip Mall)	Retail
40	Shopping Mall/Department Store (Enclosed Mall)	Retail
41	Shopping Mall/Department Store (Standalone or Strip Mall)	Retail
42	Senior Care (Assisted Living/Retirement Communities/Nursing Homes etc.)	Medical
43	Retail (Retail Shops/Unspecified Sales)	Retail
44	Agriculture (Farms/Dairy, Egg Production etc.)	Basic
45	Other Academic (Unspecified Teaching/School Administration/Dance Classes/Karate Classes etc.)	Service
46	Animal Care/Control (Veterinary/Boarding/Grooming/Supplies etc.)	Service
47	Military	Basic
48	Non-Profit	Service
49	Cemeteries	Service
50	Utilities (Gas/Electric/Water/Waste Disposal etc.)	Basic
51	Indoor Work (Non-Industrial Labor/Small Production)	Basic
52	Commercial Services (Shipping/Packaging/Plumbing/Tailoring etc.)	Basic
96	Other	Missing
98	Don't Know	Missing
99	Refused	Missing