

Standard Error Calculations for NPTS Estimates

by

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These notes describe the `table.sas` SAS macro for computing standard errors for NPTS estimates. The macro is a modified version of `tablew.sas`, a SAS macro whose purpose is to do these standard error calculations as part of the NPTS web server online analysis package (see <http://www-cta.ornl.gov/npts/>). The macro can nevertheless also be used by others using SAS to compute NPTS estimates, and we are therefore making it available via the web server. Understand, however, that the macro was designed to support the web-server calculations and not as a general analysis package. It may not suit your particular purpose. The macro is distributed in the hope that it will be useful, but **without any warranty, without even an implied warranty of merchantability or fitness for a particular purpose.**

The notes are in three sections and three appendices. The first section is about the general theory behind standard errors and confidence bound calculations for estimates computed from NPTS data. Much of the discussion in the first section is from Appendix G of the *CENVAR Variance Calculation System User's Guide* (Bureau of Census 1995). The second section is about using the SAS `table` macro to do the calculations. The third section is an example. Appendix A consists of twelve more examples; the “Standard Tables” from the NPTS User's Guide (FHWA 1997, Appendix B) are revisited. The SAS `table` macro itself is listed in Appendix B. Appendix C is a discussion of problems using subsets of the NPTS data (e.g., subsetting where clauses), and is included mainly to document the approach taken to subsetting where clauses in the web-server SAS macro `tablew.sas`.

The `tablew.sas` macro performs several functions peculiar to the requirements of the web-server analyses, and also does **not** compute several things `table.sas` does, for instance confidence intervals. However, `tablew.sas` can also be downloaded. It has code for formatting tables using the SAS `tabulate` procedure as a text formatter, and also for converting and formatting ‘All’ categories (coded with ‘.’s) in the `table.sas` output. Other than in Appendix C, however, `tablew.sas` will not be discussed further.

1. Standard Errors for NPTS Estimates Via the Ultimate Cluster Variance Formula

Standard errors in the SAS `table` macro are computed using the *ultimate cluster* variance formula (Hansen, Hurwitz, and Madow 1953). An ultimate cluster consists of the entire sample from the primary sampling unit—a household in the NPTS—from one or more stages of sampling.

1.1. Estimators of Totals and Ratios. Consider a sampling design with S strata, and, for each stratum s ($s=1, \dots, S$), n_s primary sampling unit (PSUs). Let \mathbf{A} denote a class (e.g., males age 20-30), and y , a variable (e.g., miles driven) determined for each element of \mathbf{A} . Let A denote the set of indices j for elements of the class \mathbf{A} , and let y_{sij} denote the observed value of the variable y for element j in the i^{th} sample PSU in substratum s . Also let w_{sij} denote the final adjusted sampling weight—for all stages of selection—for element sij .

Then the estimator of the total Y_A of y in the class \mathbf{A} is

$$\hat{Y}_A = \sum_{s=1}^S \sum_{i=1}^{n_s} \hat{Y}_{Asi}, \quad (1)$$

where

$$\hat{Y}_{Asi} = \sum_{j \in A} w_{sij} y_{sij}.$$

The estimator of a ratio $R = Y_A / X_B$ of a numerator total Y_A for a class **A** to a denominator total X_B for a class **B** is

$$\hat{R} = \frac{\hat{Y}_A}{\hat{X}_B}, \quad (2)$$

where \hat{Y}_A is the estimate of Y_A , calculated as in formula (1), and \hat{X}_B is the estimate of a total X_B , also calculated as in formula (1), for a variable x determined for each element of class **B**. In the SAS table macro, the class **A** is assumed to be either equal to or else a refinement of the class **B**. For example, **B** might denote males, and **A**, males, age 20-30.

Means and frequency proportions are special cases of ratios. For a mean, the classes **A** and **B** in (2) are the same, the variable x for the denominator of the ratio is the constant 1, and the total estimate \hat{X}_B is the sum of the sampling weights for all elements in class **A=B**. For a frequency proportion, the class **A** is ordinarily a strict subset of class **B**, and both the numerator and denominator variables x and y are 1 for all elements.

1.2. Variances of Estimators of Totals. From the probability model and from the definition of variance, it can be proved that the variance of an estimator of a total (1) under single-stage stratified sampling with replacement is

$$\text{Var}(\hat{Y}_A) = \sum_{s=1}^S \frac{1}{n_s} \sum_{i=1}^{N_s} p_{si} \left(\frac{Y_{Asi}}{p_{si}} - Y_{As} \right)^2, \quad (3)$$

where N_s is the total number of PSUs in substratum s (n_s , as defined above, is the number of PSUs in the sample), p_{si} is the selection probability of the i^{th} PSU in substratum s , Y_{Asi} is the population total of elements in the i^{th} PSU and class **A**, and

$$Y_{As} = \sum_{i=1}^{N_s} Y_{Asi}.$$

Similarly, it can be shown that if $n_s > 1$ for all strata, then an unbiased estimate of the variance (3) is

$$v(\hat{Y}_A) = \sum_{s=1, n_s > 1}^S \left[\frac{n_s}{n_s - 1} \sum_{i=1}^{n_s} \left(\hat{Y}_{Asi} - \frac{\hat{Y}_{As}}{n_s} \right)^2 \right]$$

(all terms defined as above). Strata with $n_s=1$ are also included in the calculation of \hat{Y}_A , however. For those strata, the n_s-1 denominator in the above variance estimate will obviously cause problems, and so, as an approximation, \hat{Y}_{As}^2 is added to the variance estimate:

$$v(\hat{Y}_A) = \sum_{s=1, n_s > 1}^S \left[\frac{n_s}{n_s - 1} \sum_{i=1}^{n_s} \left(\hat{Y}_{Asi} - \frac{\hat{Y}_{As}}{n_s} \right)^2 \right] + \sum_{s=1, n_s = 1}^S \hat{Y}_{As}^2. \quad (4)$$

The approximation, which is biased high, is good as long as there are not too many strata with $n_s=1$.¹

Unadjusted sampling weights are the reciprocals of the selection probabilities. The final sampling weights are adjusted, however, to account for statistical departures from known totals and to correct for design irregularities. For the NPTS, the weight adjustments account for households with more than one telephone number, constrain certain sums to known control totals (e.g, total number of persons), correct for nonresponse and non-coverage, and reduce nonresponse bias (FHWA 1997, Section 3G).

When there is subsampling, that is, a second, incomplete sampling stage, the variance of the total estimator exceeds (3) by a term that accounts for within-PSU components of variance. In the NPTS study, there was no subsampling. Nonresponse among individuals within households was possible, however, and the second stage is incomplete to the extent that there was nonresponse. This nonresponse is accounted for in the weight adjustments.

1.3. Covariances of Estimators of Totals and Variances of Estimators of Ratios. As with variances, it can be shown that the covariance of \hat{Y}_A and \hat{X}_B is

¹The approximation is based on the inequality, for any random variable Z , $Var(Z) \leq Mean(Z^2)$.

$$Cov(\hat{Y}_A, \hat{X}_B) = \sum_{s=1}^S \left[\frac{1}{n_s} \sum_{i=1}^{n_s} p_{si} \begin{pmatrix} \frac{Y_{Asi}}{p_{si}} & Y_{As} \end{pmatrix} \begin{pmatrix} \frac{X_{Bsi}}{p_{si}} & X_{Bs} \end{pmatrix} \right],$$

and if $n_s > 1$ for all strata, an unbiased estimator is of $Cov(\hat{Y}_A, \hat{X}_B)$ is

$$cov(\hat{Y}_A, \hat{X}_B) = \sum_{s=1}^S \left[\frac{n_s}{n_s} \frac{1}{n_s} \sum_{i=1}^{n_s} \begin{pmatrix} \hat{Y}_{Asi} & \frac{\hat{Y}_{As}}{n_s} \end{pmatrix} \begin{pmatrix} \hat{X}_{Bsi} & \frac{\hat{X}_{Bs}}{n_s} \end{pmatrix} \right].$$

In practice, as an approximation to accommodate strata with $n_s = 1$, the covariance estimate is taken as

$$cov(\hat{Y}_A, \hat{X}_B) = \sum_{s=1, n_s > 1}^S \left[\frac{n_s}{n_s} \frac{1}{n_s} \sum_{i=1}^{n_s} \begin{pmatrix} \hat{Y}_{Asi} & \frac{\hat{Y}_{As}}{n_s} \end{pmatrix} \begin{pmatrix} \hat{X}_{Bsi} & \frac{\hat{X}_{Bs}}{n_s} \end{pmatrix} \right] \sum_{s=1, n_s = 1}^S \hat{Y}_{As} \hat{X}_{Bs}.$$

The covariance enters into the following approximation for the variance of the ratio, which is based on a Taylor expansion approximation:

$$Var(\hat{R}) = Var\left(\frac{\hat{Y}_A}{\hat{X}_B}\right) \approx \frac{1}{X_B^2} Var(\hat{Y}_A) - \frac{Y_A^2}{X_B^4} Var(\hat{X}_B) - 2\frac{Y_A}{X_B^3} Cov(\hat{Y}_A, \hat{X}_B).$$

By substituting estimates for the variances and covariances, an estimate of $Var(\hat{R})$ can be computed as

$$v(\hat{R}) = \frac{1}{\hat{X}_B^2} \left[v(\hat{Y}_A) - \hat{R}^2 v(\hat{X}_B) - 2\hat{R} cov(\hat{Y}_A, \hat{X}_B) \right].$$

This variance estimate can be used to compute approximate 95% confidence intervals for \hat{R} as in

$$\hat{R} \pm 1.96 \times var(\hat{R})^{1/2},$$

where 1.96 is the 97.5 percentile of the standard normal distribution. These bounds are approximate because they depend on (A) estimates of variances and the covariance, (B) the large-sample normality of \hat{R} , and (C) Taylor's approximation.

Alternatively, an approach due to Fieller (1932) is based on the observation that since $R = Y_A / X_B$, the expected value of $\hat{Y}_A - R\hat{X}_B$ is 0. Because

$$P \left[\frac{(\hat{Y}_A - R\hat{X}_B)^2}{\text{Var}(\hat{Y}_A - R\hat{X}_B)} \leq 1.96^2 \right] \approx .95,$$

and

$$\text{Var}(\hat{Y}_A - R\hat{X}_B) = \text{Var}(\hat{Y}_A) - 2R\text{Cov}(\hat{Y}_A, \hat{X}_B) + R^2\text{Var}(\hat{X}_B),$$

substituting estimates for $\text{Var}(\hat{Y}_A)$, $\text{Var}(\hat{X}_B)$ and $\text{Cov}(\hat{Y}_A, \hat{X}_B)$ gives

$$P \left[\frac{(\hat{Y}_A - R\hat{X}_B)^2}{\hat{Y}_A^2 - 2R\hat{Y}_A\hat{X}_B + R^2\hat{X}_B^2} \leq \frac{1.96^2 v(\hat{Y}_A) - 2 \times 1.96^2 R \text{cov}(\hat{Y}_A, \hat{X}_B) + 1.96^2 R^2 v(\hat{X}_B)}{\hat{Y}_A^2 - 2R\hat{Y}_A\hat{X}_B + R^2\hat{X}_B^2} \right] \approx .95.$$

This is

$$P \left[aR^2 + bR + c \leq 0 \right] \approx .95, \quad (5)$$

where $a = \hat{X}_B^2 - 1.96^2 v(\hat{X}_B)$, $b = 2(1.96^2 \text{cov}(\hat{Y}_A, \hat{X}_B) - \hat{Y}_A \hat{X}_B)$, and $c = \hat{Y}_A^2 - 1.96^2 v(\hat{Y}_A)$. Solving the quadratic equation for two real roots produces approximate 95% confidence bounds for R.² These

²It is possible, however, that the roots might imply a confidence region that is not an interval, or the roots might not exist at all. The table macro does not compute the Fieller-type confidence bounds in either of these cases. But these cases are unusual, as the following argument shows. The roots imply a confidence region that is not an interval if $a < 0$. This is unlikely as long as the relative variance of \hat{X}_B is not large, which becomes certain as the sample size increases. The condition $a < 0$ in fact implies \hat{X}_B is not significantly different from 0, here, at the significance level .05.

The roots do not exist if $b^2 - 4ac < 0$ (i.e., the quadratic equation has no real roots). Let $s_y = v(\hat{Y}_A)^{1/2}$, $s_x = v(\hat{X}_B)^{1/2}$, $r = \text{cov}(\hat{Y}_A, \hat{X}_B) / s_y s_x$, $t = 1.96$, and assume \hat{Y}_A and \hat{X}_B are both positive or both negative. The opposite-sign case is similar. Then with a little algebra it may be shown that $b^2 - 4ac$ is

$$4t^2 s_x^2 s_y^2 \left[\left(r - \frac{\hat{X}_B \hat{Y}_A}{s_x s_y} \right)^2 - \left(\frac{\hat{X}_B}{s_x} - \frac{\hat{Y}_A}{s_y} \right)^2 - \left(1 - \frac{\hat{X}_B \hat{Y}_A}{s_x s_y} \right)^2 \right].$$

bounds are approximate because they depend on (A) estimates of variances and the covariance, and (B) the large-sample-approximate normality of $\hat{Y}_A R\hat{X}_B$. They do not depend on Taylor's approximation. Notice that the normal approximation applies to the distribution of $\hat{Y}_A R\hat{X}_B$ rather than \hat{R} , as in the Taylor approximation approach. Cochran (1977) notes "This approach requires fewer assumptions than the normal approximation [to the distribution of \hat{R}] and takes some account of the skewness of the distribution of \hat{R} ."

2. Computing Standard Errors with the SAS table Macro

To use the SAS table macro, first be sure that SAS can find it. Either include it directly in your SAS code, or use the mautosource option and the appropriate macro path, for example, as in

```
options mautosource SASAUTOS=(" "c:\bin" "c:\Programs\SAS\core\sasmacro");
```

Also before using the macro, the SAS library containing the NPTS formats catalog should be defined using a SAS libname statement (e.g., libname LIBRARY 'd:\npts\data');

The table macro is not designed to handle missing values or subsetting where clauses.³ **Delete missing, logically excluded, or otherwise unwanted observations before using the macro.** Also ensure that missing values are reasonable in the first place. For example, suppose for a particular household, a particular variable is missing for every person. Then the household should probably also be regarded as missing, and that households should generally not contribute to the denominator of an estimate of the variable's per-household average. For ratios, the number of households for numerator and denominator variables should generally be the same.

For any particular analysis variable, the sample number of households in each substratum might depend on missing values of that variable. What if the analysis variable is missing for one person in a particular household, but not for another? Strictly speaking, adjustments for non-response to final weights should be tailored to the missing value structure of the particular analysis variable. No nonresponse adjustments to weights are made in the table macro, however, other than those already incorporated into the NPTS final adjusted weights. The final adjusted weights can be used as an approximation, but the approximation may be poor if there are a lot of missing values.

Even though there is a corresponding upper level (e.g., person) observation for every lower-level (e.g., trip) observation, missing upper-level values may entail deleting **lower**-level observations. For example, in computing trips per person for females and males, if the sex of a person is missing, then both the trip and person-data for that person would ordinarily be deleted. (Because of the way the

For unconstrained r , this is minimized where $r = \hat{X}_B \hat{Y}_A / s_x s_y$, which is ordinarily large and positive. However, because $|r| \leq 1$ (Cauchy-Schwarz inequality), the minimum for $|r| \leq 1$ typically occurs where $r = 1$, at which point $b^2 - 4ac$ is positive.

Thus $b^2 - 4ac$ tends to be positive in general.

³The tablew.sas macro does do this for the specially prepared data NPTS sets used by the web server.

table.sas macro handles missing values, these would be deleted anyway.)

To use the table macro, a SAS data set containing a variable *nhouse*, the number of households in each stratum (varstrat) and substratum (substrat), must be prepared and entered as a macro argument (see Table 1). If no households are excluded because of missing values or logical subsetting, then that data set can easily be computed from the household data set (hhold95). If, however, households are excluded by a subsetting “where” clause or because of missing values, then the number of households in a given substratum may be smaller than the total number of households for the entire survey, for that substratum.

In preparing the nhouse data set, also remember that higher-level variables might not be represented in lower-level data. For example, not every person need take a trip; not every household necessarily has a vehicle, or a female. It may be necessary to merge lower-level (e.g., trip) data with higher-level (e.g., person or household) data to ensure that these “no-shows”—households not logically excluded but not represented in the lower level data—are properly counted.

The table macro is called as

```
%table(outdata, indatay, ywt, yvar, rowvar, colvar, pagevar,  
       indatax, xwt, xvar, RCPx, rowfmt, colfmt, pagefmt, nhouse);
```

The macro creates a SAS data set *outdata*, which is the only output argument. The macro can compute a weighted mean—the ratio of a weighted analysis variable sum to the corresponding sum of weights. Frequency proportions can be computed either by making the y analysis variable an indicator, or by using both y variables (class **A**) and x variables (class **B**). If *yvar* is not entered, it is assumed to be identically equal to 1.

Table 1 defines the other input arguments. Optional arguments may be missing, but there must always be 14 delimiting commas. Input data sets are unchanged on output. The SAS missing variable code ‘.’ or ‘ ’ is not admitted for defining a legitimate class (i.e., is dropped in proc means): Use something like 999 for missing values instead. (This is because proc means generates its own ‘.’ values for the “All” categories.)

Table 2 lists the variables in the output data set created with the table macro. Not all variables are necessarily created (depending on optional inputs). These variable names are reserved words; they should not be used as macro arguments. The output variables listed in italics are arguments, the names supplied by the user. Names not in italics are the actual names of the output variables. Note that there is an output variable *xvar* (no italics) as distinguished from the input argument *xvar*.

The ratio lower confidence bounds are allowed to be negative to accommodate cases when numerators may be negative. If the LCBs turn out negative when they are logically nonnegative, set them to zero. But if ratio estimate **denominators** turn out nonpositive, ratio estimates and variances are not computed. Further, Fieller confidence bounds are not computed if either $a < 0$ or $b^2 - 4ac < 0$ (no real roots) in the quadratic equation (5) (see Section 1).

3. Examples

Running the SAS code in Exhibit 1 first creates formats for trip purpose and age category. It then creates a SAS data set *person* and a SAS data set *trip* from the original NPTS SAS data sets *person95* and *daytrip95*, in the SAS library ‘npts’. Age is broken into nine classes, including an “unknown” class. Trip purpose is recorded in the NPTS SAS variable *whytrip90*. No observations are excluded or missing. Notice that the class variable *whytrip90* is at the trip level, which is lower than the level of person, to which the age class variable applies.

Because no observations are missing or excluded, the data set *nhouse* containing the household counts for each stratum (*varstrat*) and substratum (*substrat*) are computed simply as frequency counts in the NPTS household level SAS data set *hhold95* (also in the NPTS SAS library).⁴

The data sets *person95* and *daytrip95* and the *nhouse* data sets are used as arguments to the table macro, which is used to estimate age-specific average trips per person for each trip purpose. The output of the example (Exhibit 1), which is simply a “contents” listing and a printout of the SAS data set created by the macro, is in Table 3a and 3b. Note that some of the variable labels are incomplete (truncated). This is because the labels are created automatically from labels of input variables, and because of the SAS limit for forty characters in labels. Macro users may need to redefine labels for variables with labels produced automatically.

Twelve more examples are in Appendix A. These are the Standard Tables from Appendix B of the NPTS *User’s Guide* (FHWA 1997). Both programs and output are in the appendix. The macro used to produce this version of the Standard Tables was exactly the same as *table.sas*, except (1) the output data set was suppressed (not needed), and (2) additional code was added to handle the ‘All’ categories and to format the tables using the SAS *tabulate* procedure.

Although the standard errors in the versions of Standard Table 1 and 3 produced here coincide exactly with the standard errors in Standard Tables 1 and 3 in the *User’s Guide*, the other standard errors differ slightly. This is because of the way “no-shows” were handled. For example, for Standard Table 6 (travel day person trips by age and sex), the input day-trip data contains no entries for persons (or households) with no trips. Persons without trips do not contribute to the count totals, but they do affect the standard errors, which depend on the total number of households in each substratum, including those with no trips. (See equation (4). The dependency is through $n_s/(n_s - 1)$, which increases in n_s . When households are undercounted, standard errors are too small.) The “no-shows” were not counted in the *User’s Guide* Standard Table 6; thus the discrepancy.

There is no discrepancy in the standard errors for Standard Table 1 (number of households by household income and number of vehicles), because all households are represented in the input household data set. The standard errors in the two versions of Standard Table 2 (number of vehicles by age and type) differ, however, because of households without vehicles, which are not represented

⁴e.g., `proc freq data=npts.hhold95; table substrat/noprint out=a (drop=percent rename=(count=nhouse)); by varstrat;`

Table 1. Input arguments to SAS table macro*

Argument	Description	Necessary/Optional?
<i>indatay</i>	input data set containing y variables. Must be sorted by varstrat substrat houseid.	Necessary
<i>ywt</i>	y variable weight—assumed nonmissing	Necessary
<i>yvar</i>	y analysis variable. Assumed equal to 1 if not entered.	Optional
<i>rowvar</i>	first class variable (defines rows)	Optional, but necessary if colvar is defined
<i>colvar</i>	second class variable (defines columns)	Optional, but necessary if pagevar is defined
<i>pagevar</i>	third class variable (defines pages)	Optional
<i>indatax</i>	input data set containing x variables. Must be sorted by varstrat substrat houseid. May be same as indatay.	Optional
<i>xwt</i>	x variable weight—if defined, assumed nonmissing	Optional but necessary if indatax is defined.
<i>xvar</i>	x analysis variable. Assumed equal to 1 if not entered, but <i>xwt</i> is.	Optional
<i>RCPx</i>	subset of rowvar colvar pagevar to define denominator classes. RCPx must be formable by deletion of zero or more entries in the rowvar colvar pagevar list.	Optional
<i>rowfmt</i>	name of user-supplied format for row variable (to override default)	Optional
<i>colfmt</i>	name of user-supplied format for column variable (to override default)	Optional
<i>pagefmt</i>	name of user-supplied format for page variable (to override default)	Optional
<i>nhouse</i>	SAS data set containing varstrat, substrat, and number of households in each substratum. Must be sorted by varstrat and substrat.	Necessary

**outdata* is the only output argument. See text for discussion.

Table 2. Variables in output data set (*outdata*) created with table macro*

Output variable	Description
<i>ywt</i> [†]	Sum of input y-weights
<i>yvar</i> [†]	Weighted sum of input y variables
<i>rowvar</i> [†]	Same as input
<i>colvar</i> [†]	Same as input
<i>pagevar</i> [†]	Same as input
<i>xwt</i> [†]	Sum of input x-weights
xvar	Weighted sum of input x variables
ny	Number of observations with a <i>yvar</i> , or, if no <i>yvar</i> , then a <i>ywt</i>
nx	Number of observations with an xvar
std_erry	Standard error of <i>yvar</i> total
se_ywt	Standard error of <i>ywt</i> total
std_errx	Standard error of xvar total
ratioy	Ratio of <i>yvar</i> total to <i>ywt</i> total
ratiox	Ratio of <i>yvar</i> total to xvar total
se_raty	Standard error of ratioy, based on Taylor approximation
se_ratx	Standard error of ratiox, based on Taylor approximation
corry	Weighted correlation of <i>yvar</i> and <i>ywt</i>
corrxx	Weighted correlation of <i>yvar</i> and xvar
lcb_fy	Lower of Fieller-type 95% two-sided confidence bounds for ratioy
ucb_fy	Upper of Fieller-type 95% two-sided confidence bounds for ratioy
lcb_fx	Lower of Fieller-type 95% two-sided confidence bounds for ratiox
ucb_fx	Upper of Fieller-type 95% two-sided confidence bounds for ratiox
lcb_tx	Lower of Taylor-type 95% two-sided confidence bounds for ratioy
ucb_tx	Upper of Taylor-type 95% two-sided confidence bounds for ratioy
lcb_ty	Lower of Taylor-type 95% two-sided confidence bounds for ratiox
ucb_ty	Upper of Taylor-type 95% two-sided confidence bounds for ratiox

*Not all variables are necessarily created.

[†]Italicized names are argument names. Other names are actual names.

```

options nodate nonumber ps=62 ls=80 missing=' ';
libname npts 'd:\npts\data';
libname LIBRARY 'd:\npts\data';

proc format;
value $purpfmt
'00'='TOTAL'
'01'='To/From Work'
'02'='Work Related Business'
'03','04','06'='Family/Personal Business'
'05'='Civic, Educational & Religious'
'07'-'10'='Social & Recreational'
'11'='Other'
'98'='Unreported';

value age
1 = '5-15' 2 = '16-19' 3 = '20-24'
4 = '25-34' 5 = '35-44' 6 = '45-54'
7 = '55-64' 8 = '65+' 9 = 'Unknown';

data person;
set npts.person95 (keep=houseid personid r_age varstrat substrat wtperfin);
if 5 <= r_age <= 15 then age = 1;
else if 16 <= r_age <= 19 then age = 2;
else if 20 <= r_age <= 24 then age = 3;
  else if 25 <= r_age <= 34 then age = 4;
else if 35 <= r_age <= 44 then age = 5;
else if 45 <= r_age <= 54 then age = 6;
else if 55 <= r_age <= 64 then age = 7;
else if r_age >= 65 and r_age not in (998,999) then age = 8;
else if r_age in (998,999) then age = 9;
label age='Age';

proc sort;
by varstrat substrat houseid personid;
proc sort data=npts.daytrp95
(keep=houseid personid varstrat substrat whytrp90 wttrdfin)
out=trip;
by varstrat substrat houseid personid;

data trip;
merge trip person;
by varstrat substrat houseid personid;

%table(a,trip,wttrdfin,,age,whytrp90,,
person,wtperfin,,age,age,$purpfmt,,npts.nhouse);

data a;
set a;
if age=. then age=11;
if whytrp90="" then whytrp90='99';

proc sort;
by age whytrp90;

proc format;
value newage 11='All' other=[age];
value $newpurp '99'='All' other=[$purpfmt];

proc contents data=here.out;
title "Example--Contents of Output Data Set";

proc print data=a label;
title "Example--Travel Period Trips per Person by Trip Purpose";
format age newage. whytrp90 $newpurp.;

```

Exhibit 1. SAS program for Example 1.

Table 3a. Contents of Output Data Set

CONTENTS PROCEDURE

Data Set Name:	WORK.A	Observations:	72
Member Type:	DATA	Variables:	16
Engine:	V612	Indexes:	0
Created:	9:12 Wednesday, March 10, 1999	Observation Length:	122
Last Modified:	9:12 Wednesday, March 10, 1999	Deleted Observations:	0
Protection:		Compressed:	NO
Data Set Type:		Sorted:	YES
Label:			

-----Engine/Host Dependent Information-----

Data Set Page Size:	8192
Number of Data Set Pages:	2
File Format:	607
First Data Page:	1
Max Obs per Page:	66
Obs in First Data Page:	48

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Len	Pos	Format	Label
1	AGE	Num	8	0	AGE.	Age
16	CORRX	Num	8	114		Corr Final person wt person-nonresp adju
13	LCB_FX	Num	8	90		Fieller LCB X-Ratio
14	LCB_TX	Num	8	98		Taylor LCB X-Ratio
6	NX	Num	8	34		Num. with Final person wt person-nonresp
3	NY	Num	8	10		Num. with Final travel day trip weight
9	RATIOX	Num	8	58		Ratio Final travel day trip weight to Fi
10	SE_RATX	Num	8	66		Taylor SE Ratio
11	SE_RATX1	Num	8	74		Fixed-denom. Ratio SE
8	STD_ERRX	Num	8	50		SE Final person wt person-nonresp adjust
5	STD_ERRY	Num	8	26		SE Final travel day trip weight
12	UCB_FX	Num	8	82		Fieller UCB X-Ratio
15	UCB_TX	Num	8	106		Taylor UCB X-Ratio
2	WHYTRP90	Char	2	8	\$PURPFMT.	Purpose of trip (1990 definition)
4	WTTDFIN	Num	8	18		Final travel day trip weight
7	XVAR	Num	8	42		Final person wt person-nonresp adjusted

-----Sort Information-----

Sortedby:	AGE WHYTRP90
Validated:	YES
Character Set:	ANSI

Table 3b. Travel Period Trips per Person by Trip Purpose

OBS	Age	Purpose of trip (1990 definition)	Num. with Final travel day trip weight	Final travel day trip weight
1	5-15	To/From Work	699	555989926.66
2	5-15	Work Related Business	88	64934414.49
3	5-15	Family/Personal Business	18008	17316791444.39
4	5-15	Civic, Educational & Religious	18975	16772292825.50
5	5-15	Social & Recreational	24336	23407178267.94
6	5-15	Other	153	131659160.13
7	5-15	Unreported	13	5757600.58
8	5-15	All	62272	58254603639.69
9	16-19	To/From Work	3073	3263729328.78
10	16-19	Work Related Business	164	180225338.45
11	16-19	Family/Personal Business	7703	8473506783.00
12	16-19	Civic, Educational & Religious	4513	4250818350.80
13	16-19	Social & Recreational	6758	7566931797.46
14	16-19	Other	48	46993560.91

OBS	SE Final travel day trip weight	Num. with Final person wt person-nonresp	Final person wt person-nonresp adjusted	SE Final person wt person-nonresp adjust	Ratio Final travel day trip weight to Fi
1	49793745.17	17082	43091967.42	821.79	12.90
2	14109868.58	17082	43091967.42	28.67	1.51
3	478505994.54	17082	43091967.42	5.35	401.86
4	386355476.19	17082	43091967.42	2.31	389.22
5	598387563.62	17082	43091967.42	1.52	543.19
6	28244717.62	17082	43091967.42	1.23	3.06
7	3525572.06	17082	43091967.42	1.11	0.13
8	1125015730.39	17082	43091967.42	675338.96	1351.87
9	144218932.54	4893	14074361.38	574.34	231.89
10	34021188.07	4893	14074361.38	23.97	12.81
11	307705913.11	4893	14074361.38	4.90	602.05
12	153906974.32	4893	14074361.38	2.21	302.03
13	277163079.43	4893	14074361.38	1.49	537.64
14	18851863.91	4893	14074361.38	1.22	3.34

OBS	Taylor SE Ratio	Fixed-denom. Ratio SE	Fieller UCB X-Ratio	Fieller LCB X-Ratio	Taylor LCB X-Ratio	Taylor UCB X-Ratio	Corr Final person wt person-nonresp adju
1	1.1276	1.1555	15.10	10.68	10.69	15.11	112.11
2	0.3261	0.3274	2.14	0.87	0.87	2.15	1321.61
3	6.5539	11.1043	414.32	388.62	389.01	414.70	72461.36
4	2.5459	8.9658	393.86	383.85	384.23	394.21	197198.99
5	6.5811	13.8863	555.57	529.75	530.29	556.09	280768.09
6	0.6528	0.6555	4.33	1.77	1.78	4.33	30807.36
7	0.0818	0.0818	0.29	-0.03	-0.03	0.29	7575.81
8	14.9093	26.1073	1381.09	1322.62	1322.65	1381.09	0.82
9	6.6548	10.2469	244.44	218.34	218.85	244.93	313.07
10	2.3772	2.4172	17.44	8.12	8.15	17.46	1822.69
11	9.6672	21.8629	619.81	581.84	583.11	621.00	41994.65
12	5.6302	10.9353	312.52	290.42	290.99	313.06	84629.82
13	8.6186	19.6928	553.45	519.59	520.75	554.53	140095.51
14	1.3347	1.3394	5.95	0.72	0.72	5.95	16298.81

Table 3b (cont'd). Travel Period Trips per Person by Trip Purpose

OBS	Age	Purpose of trip (1990 definition)	Num. with Final travel day trip weight	Final travel day trip weight
15	16-19	Unreported	3	6747589.13
16	16-19	All	22262	23788952748.53
17	20-24	To/From Work	5348	6208420861.19
18	20-24	Work Related Business	459	519622081.82
19	20-24	Family/Personal Business	8798	10633820370.80
20	20-24	Civic, Educational & Religious	1730	2242405885.47
21	20-24	Social & Recreational	5638	6682365152.37
22	20-24	Other	42	55174791.95
23	20-24	Unreported	2	6199369.04
24	20-24	All	22017	26348008512.64
25	25-34	To/From Work	17088	18599928241.65
26	25-34	Work Related Business	2113	2353939847.17
27	25-34	Family/Personal Business	31722	34929022989.02
28	25-34	Civic, Educational & Religious	2159	2552560417.10

OBS	SE Final travel day trip weight	Num. with Final person wt person-nonresp	Final person wt person-nonresp adjusted	SE Final person wt person-nonresp adjust	Ratio Final travel day trip weight to Fi
15	5568403.74	4893	14074361.38	1.10	0.48
16	649902194.71	4893	14074361.38	329870.38	1690.23
17	220320748.35	4934	16127711.36	638.66	384.95
18	73591879.76	4934	16127711.36	25.27	32.22
19	394826379.53	4934	16127711.36	5.03	659.35
20	170738801.40	4934	16127711.36	2.24	139.04
21	262249792.05	4934	16127711.36	1.50	414.34
22	14283840.35	4934	16127711.36	1.22	3.42
23	6199369.04	4934	16127711.36	1.11	0.38
24	769345251.32	4934	16127711.36	407885.74	1633.71
25	399416627.30	14539	43365959.84	790.69	428.91
26	131616855.43	14539	43365959.84	28.12	54.28
27	725624338.95	14539	43365959.84	5.30	805.45
28	139384133.04	14539	43365959.84	2.30	58.86

OBS	Taylor SE Ratio	Fixed-denom. Ratio SE	Fieller UCB X-Ratio	Fieller LCB X-Ratio	Taylor LCB X-Ratio	Taylor UCB X-Ratio	Corr Final person wt person-nonresp adju
15	0.3953	0.3956	1.25	-0.30	-0.30	1.25	9072.92
16	25.8718	46.1763	1741.12	1639.59	1639.53	1740.94	0.83
17	3.1100	13.6610	390.23	377.91	378.86	391.05	424.85
18	4.4446	4.5631	40.87	23.44	23.51	40.93	2316.14
19	6.1538	24.4812	669.89	645.54	647.29	671.41	55795.10
20	9.0410	10.5867	156.35	120.90	121.32	156.76	74127.63
21	7.3158	16.2608	427.73	398.99	400.00	428.68	168568.73
22	0.8815	0.8857	5.14	1.69	1.69	5.15	16011.40
23	0.3842	0.3844	1.14	-0.37	-0.37	1.14	6853.75
24	24.3810	47.7033	1681.59	1585.90	1585.92	1681.50	0.86
25	1.8645	9.2104	432.21	424.87	425.25	432.56	564.75
26	2.8129	3.0350	59.75	48.72	48.77	59.79	6079.23
27	4.3309	16.7326	813.34	796.31	796.96	813.94	79255.27
28	2.9877	3.2141	64.67	52.96	53.01	64.72	69905.56

Table 3b (cont'd). Travel Period Trips per Person by Trip Purpose

OBS	Age	Purpose of trip (1990 definition)	Num. with Final travel day trip weight	Final travel day trip weight
29	25-34	Social & Recreational	13725	15584448471.63
30	25-34	Other	93	94228637.39
31	25-34	Unreported	10	6118535.57
32	25-34	All	66910	74120247139.53
33	35-44	To/From Work	21769	18192221602.61
34	35-44	Work Related Business	3455	3033505180.79
35	35-44	Family/Personal Business	44583	37950899004.79
36	35-44	Civic, Educational & Religious	2605	2356517151.01
37	35-44	Social & Recreational	15949	14119330218.26
38	35-44	Other	106	105939855.96
39	35-44	Unreported	30	19292330.88
40	35-44	All	88497	75777705344.30
41	45-54	To/From Work	16205	12336750803.51
42	45-54	Work Related Business	2544	2006788375.68

OBS	SE Final travel day trip weight	Num. with Final person wt person-nonresp	Final person wt person-nonresp adjusted	SE Final person wt person-nonresp adjust	Ratio Final travel day trip weight to Fi
29	381298302.71	14539	43365959.84	1.52	359.37
30	22728243.60	14539	43365959.84	1.23	2.17
31	5005568.74	14539	43365959.84	1.11	0.14
32	1249456199.38	14539	43365959.84	625185.66	1709.18
33	343254131.68	17994	42329000.00	741.01	429.78
34	159828950.52	17994	42329000.00	27.22	71.66
35	693786522.48	17994	42329000.00	5.22	896.57
36	130093715.22	17994	42329000.00	2.28	55.67
37	332197006.38	17994	42329000.00	1.51	333.56
38	18893480.11	17994	42329000.00	1.23	2.50
39	12206746.05	17994	42329000.00	1.11	0.46
40	1162909261.18	17994	42329000.00	549090.37	1790.21
41	256966468.47	14022	31059973.98	662.51	397.19
42	111408092.45	14022	31059973.98	25.74	64.61

OBS	Taylor SE Ratio	Fixed-denom. Ratio SE	Fieller UCB X-Ratio	Fieller LCB X-Ratio	Taylor LCB X-Ratio	Taylor UCB X-Ratio	Corr Final person wt person-nonresp adju
29	5.2902	8.7926	369.48	348.74	349.00	369.74	223043.13
30	0.5221	0.5241	3.19	1.15	1.15	3.20	32135.90
31	0.1154	0.1154	0.37	-0.09	-0.09	0.37	10062.90
32	15.5163	28.8119	1739.62	1678.78	1678.77	1739.59	0.84
33	1.9272	8.1092	433.29	425.72	426.00	433.56	508.47
34	3.5569	3.7759	78.59	64.65	64.69	78.64	4612.74
35	0.0000	16.3903			896.57	896.57	74429.20
36	2.8717	3.0734	61.26	50.00	50.04	61.30	64943.11
37	5.1058	7.8480	343.37	323.35	323.55	343.57	190023.60
38	0.4446	0.4463	3.37	1.63	1.63	3.37	23708.06
39	0.2882	0.2884	1.02	-0.11	-0.11	1.02	12005.18
40	15.0502	27.4731	1819.73	1760.71	1760.71	1819.71	0.84
41	2.5302	8.2732	401.86	391.92	392.23	402.15	442.60
42	3.3304	3.5869	71.09	58.03	58.08	71.14	4618.81

Table 3b (cont'd). Travel Period Trips per Person by Trip Purpose

OBS	Age	Purpose of trip (1990 definition)	Num. with Final travel day trip weight	Final travel day trip weight
43	45-54	Family/Personal Business	30966	24636283906.11
44	45-54	Civic, Educational & Religious	1944	1694979510.58
45	45-54	Social & Recreational	11892	9781066452.99
46	45-54	Other	86	71877590.80
47	45-54	Unreported	16	4143715.18
48	45-54	All	63653	50531890354.85
49	55-64	To/From Work	7242	5584280512.82
50	55-64	Work Related Business	1310	1187769832.59
51	55-64	Family/Personal Business	20144	16186271647.51
52	55-64	Civic, Educational & Religious	1451	1275279205.23
53	55-64	Social & Recreational	8430	6694238003.84
54	55-64	Other	67	70957604.09
55	55-64	Unreported	6	10196598.98
56	55-64	All	38650	31008993405.06

OBS	SE Final travel day trip weight	Num. with Final person wt person-nonresp	Final person wt person-nonresp adjusted	SE Final person wt person-nonresp adjust	Ratio Final travel day trip weight to Fi
43	528311563.40	14022	31059973.98	5.07	793.18
44	96001823.36	14022	31059973.98	2.25	54.57
45	253942558.26	14022	31059973.98	1.50	314.91
46	12356737.98	14022	31059973.98	1.23	2.31
47	2473052.86	14022	31059973.98	1.11	0.13
48	859524934.75	14022	31059973.98	438922.87	1626.91
49	177200812.29	9205	20377026.02	605.96	274.05
50	128910368.62	9205	20377026.02	24.62	58.29
51	440893403.97	9205	20377026.02	4.96	794.34
52	89368570.95	9205	20377026.02	2.23	62.58
53	223025163.33	9205	20377026.02	1.49	328.52
54	16811214.94	9205	20377026.02	1.22	3.48
55	8050413.09	9205	20377026.02	1.11	0.50
56	713908799.33	9205	20377026.02	367185.23	1521.76

OBS	Taylor SE Ratio	Fixed-denom. Ratio SE	Fieller UCB X-Ratio	Fieller LCB X-Ratio	Taylor LCB X-Ratio	Taylor UCB X-Ratio	Corr Final person wt person-nonresp adju
43	6.6672	17.0094	805.67	779.51	780.12	806.25	55557.49
44	2.8946	3.0909	60.20	48.86	48.90	60.24	48009.86
45	5.3480	8.1759	325.16	304.19	304.43	325.39	153707.20
46	0.3954	0.3978	3.09	1.54	1.54	3.09	26862.17
47	0.0796	0.0796	0.29	-0.02	-0.02	0.29	1545.88
48	16.1035	27.6731	1658.51	1595.37	1595.35	1658.48	0.81
49	5.3517	8.6961	284.21	263.22	263.56	284.54	331.47
50	6.0075	6.3263	69.94	46.38	46.52	70.06	4412.22
51	6.3658	21.6368	805.82	780.79	781.86	806.82	51093.63
52	4.0946	4.3858	70.53	54.48	54.56	70.61	41146.41
53	7.1636	10.9449	342.16	314.07	314.48	342.56	130006.28
54	0.8205	0.8250	5.09	1.87	1.87	5.09	21500.69
55	0.3949	0.3951	1.27	-0.27	-0.27	1.27	6548.59
56	20.3902	35.0350	1561.68	1481.70	1481.80	1561.73	0.81

Table 3b (cont'd). Travel Period Trips per Person by Trip Purpose

OBS	Age	Purpose of trip (1990 definition)	Num. with Final travel day trip weight	Final travel day trip weight
57	65+	To/From Work	2473	2159701913.95
58	65+	Work Related Business	576	512938289.56
59	65+	Family/Personal Business	27612	23637216340.48
60	65+	Civic, Educational & Religious	2173	2209681819.46
61	65+	Social & Recreational	11860	10526440556.77
62	65+	Other	62	45815161.07
63	65+	Unreported	8	8168109.74
64	65+	All	44764	39099962191.03
65	All	To/From Work	73897	66901023191.17
66	All	Work Related Business	10709	9859723360.55
67	All	Family/Personal Business	189536	173763812486.10
68	All	Civic, Educational & Religious	35550	33354535165.15
69	All	Social & Recreational	98588	94361998921.26
70	All	Other	657	622646362.30

OBS	SE Final travel day trip weight	Num. with Final person wt person-nonresp	Final person wt person-nonresp adjusted	SE Final person wt person-nonresp adjust	Ratio Final travel day trip weight to Fi
57	125657256.80	12691	31249000.00	678.53	69.11
58	53604127.55	12691	31249000.00	26.05	16.41
59	514549929.48	12691	31249000.00	5.10	756.42
60	122096796.23	12691	31249000.00	2.26	70.71
61	289083161.42	12691	31249000.00	1.50	336.86
62	12813930.47	12691	31249000.00	1.23	1.47
63	6714533.28	12691	31249000.00	1.11	0.26
64	758552694.68	12691	31249000.00	460404.38	1251.24
65	646773626.35	95360	241675000.00	1131.84	276.82
66	282632045.60	95360	241675000.00	33.64	40.80
67	1470189014.70	95360	241675000.00	5.80	719.00
68	575578075.11	95360	241675000.00	2.41	138.01
69	1071991283.70	95360	241675000.00	1.55	390.45
70	56209267.16	95360	241675000.00	1.25	2.58

OBS	Taylor SE Ratio	Fixed-denom. Ratio SE	Fieller UCB X-Ratio	Fieller LCB X-Ratio	Taylor LCB X-Ratio	Taylor UCB X-Ratio	Corr Final person wt person-nonresp adju
57	3.7641	4.0212	76.43	61.68	61.74	76.49	165.85
58	1.6809	1.7154	19.70	13.11	13.12	19.71	2494.80
59	5.5549	16.4661	766.71	744.90	745.53	767.30	59057.30
60	3.6000	3.9072	77.71	63.59	63.66	77.77	57730.75
61	6.0672	9.2510	348.47	324.68	324.97	348.75	162686.10
62	0.4089	0.4101	2.27	0.66	0.66	2.27	19419.86
63	0.2148	0.2149	0.68	-0.16	-0.16	0.68	9665.32
64	16.2342	24.2745	1283.09	1219.43	1219.42	1283.06	0.74
65	1.8723	2.6762	280.47	273.13	273.15	280.49	526.97
66	1.1327	1.1695	43.01	38.57	38.58	43.02	6373.26
67	3.2687	6.0833	725.33	712.52	712.59	725.40	125375.02
68	1.9974	2.3816	141.91	134.08	134.10	141.93	256827.73
69	3.2219	4.4357	396.72	384.09	384.14	396.76	417869.79
70	0.2320	0.2326	3.03	2.12	2.12	3.03	45234.36

Table 3b (cont'd). Travel Period Trips per Person by Trip Purpose

OBS	Age	Purpose of trip (1990 definition)	Num. with Final travel day trip weight	Final travel day trip weight
71	All	Unreported	88	66623849.10
72	All	All	409025	378930363335.63

OBS	SE Final travel day trip weight	Num. with Final person wt person-nonresp	Final person wt person-nonresp adjusted	SE Final person wt person-nonresp adjust	Ratio Final travel day trip weight to Fi
71	19309464.25	95360	241675000.00	1.12	0.28
72	2645114983.31	95360	241675000.00	1281054.77	1567.93

OBS	Taylor SE Ratio	Fixed-denom. Ratio SE	Fieller UCB X-Ratio	Fieller LCB X-Ratio	Taylor LCB X-Ratio	Taylor UCB X-Ratio	Corr Final person wt person-nonresp adju
71	0.0799	0.0799	0.43	0.12	0.12	0.43	6018.26
72	7.1334	10.9449	1581.92	1553.95	1553.95	1581.91	0.76

Acknowledgement

Thanks to Jenny Young for finding bugs, to Paul Moore for initial advice, to Pat Hu for the idea of doing standard errors for NPTS web-server estimates, and to Susan Liss.

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Appendix A. NPTS Standard Tables

Standard Table 1: Number of Households, by Family Income and Household Vehicles

		Number of Household Vehicles				
		None	One	Two	Three	Four+
Household Income <\$10K	Sample Size	1,080	1,427	402	68	20
	Wgt'd Count	2,944,288	3,939,324	1,207,300	225,770	93,358
	Std. Err.	140,345	160,009	83,377	38,534	25,817
\$10-25K	Sample Size	907	3,967	2,248	507	141
	Wgt'd Count	2,255,860	10,331,589	5,561,070	1,379,507	378,518
	Std. Err.	119,021	253,353	168,652	81,979	44,592
\$25-50K	Sample Size	473	3,946	6,615	1,882	583
	Wgt'd Count	888,684	9,953,426	14,713,226	4,817,604	1,459,974
	Std. Err.	62,303	246,090	267,590	161,961	85,369
\$50-100K	Sample Size	132	1,087	5,081	1,751	638
	Wgt'd Count	171,554	2,475,460	10,173,760	3,919,557	1,531,531
	Std. Err.	22,452	118,582	218,107	136,109	90,860
\$100K+	Sample Size	43	168	1,016	433	195
	Wgt'd Count	47,818	409,964	2,088,132	1,022,297	450,611
	Std. Err.	10,258	48,092	100,548	73,697	45,378
Unknown	Sample Size	708	2,083	2,915	1,075	442
	Wgt'd Count	1,680,492	4,954,344	6,280,087	2,497,748	1,137,147
	Std. Err.	98,538	173,353	176,790	112,202	78,066
All	Sample Size	3,343	12,678	18,277	5,716	2,019
	Wgt'd Count	7,988,695	32,064,108	40,023,575	13,862,483	5,051,140
	Std. Err.	213,285	400,078	370,381	252,747	158,720

(CONTINUED)

Standard Table 1: Number of Households, by Family Income and Household Vehicles

		Number of Household Vehicles
		All
Household Income <\$10K	Sample Size	2,997
	Wgt'd Count	8,410,039
	Std. Err.	228,653
\$10-25K	Sample Size	7,770
	Wgt'd Count	19,906,544
	Std. Err.	321,484
\$25-50K	Sample Size	13,499
	Wgt'd Count	31,832,914
	Std. Err.	371,459
\$50-100K	Sample Size	8,689
	Wgt'd Count	18,271,863
	Std. Err.	281,316
\$100K+	Sample Size	1,855
	Wgt'd Count	4,018,821
	Std. Err.	139,628
Unknown	Sample Size	7,223
	Wgt'd Count	16,549,819
	Std. Err.	284,099
All	Sample Size	42,033
	Wgt'd Count	98,990,000
	Std. Err.	330,306

Standard Table 2: Number of Household Vehicles, by Vehicle Age and Type

		Vehicle Type				
		Automobile	Van	Sport Utility	Pickup	Other truck
Vehicle Age (Yrs)						
0-2	Sample Size	11,032	2,057	1,947	2,523	30
	Wgt'd Count	24,660,513	4,310,152	4,304,689	6,459,390	56,163
	Std. Err.	362,023	148,699	151,441	191,622	18,042
3-5	Sample Size	10,489	1,422	1,128	2,030	25
	Wgt'd Count	23,327,349	3,323,573	2,560,418	5,299,310	82,067
	Std. Err.	351,937	132,829	117,424	169,344	24,423
6-9	Sample Size	15,165	1,544	1,336	3,318	43
	Wgt'd Count	32,943,390	3,491,319	2,810,720	7,721,340	100,745
	Std. Err.	400,037	140,351	122,796	202,074	26,628
10+	Sample Size	11,446	867	890	3,760	153
	Wgt'd Count	29,436,145	2,332,207	2,215,864	10,644,663	412,676
	Std. Err.	434,977	121,365	110,727	246,126	53,745
Unknown	Sample Size	1,277	136	113	370	23
	Wgt'd Count	2,916,894	352,850	263,018	985,402	44,178
	Std. Err.	143,685	49,284	36,082	77,611	13,546
All	Sample Size	49,409	6,026	5,414	12,001	274
	Wgt'd Count	113,284,291	13,810,102	12,154,709	31,110,105	695,829
	Std. Err.	687,055	273,064	258,302	406,691	74,508

(CONTINUED)

Standard Table 2: Number of Household Vehicles, by Vehicle Age and Type

		Vehicle Type				
		RV	Motorcycle	Other	Unknown	All
Vehicle Age (Yrs)						
0-2	Sample Size	25	112	10	87	17,823
	Wgt'd Count	55,676	275,788	26,667	198,606	40,347,644
	Std. Err.	17,081	42,779	9,618	36,327	467,975
3-5	Sample Size	36	66	9	55	15,260
	Wgt'd Count	81,789	121,912	14,091	153,232	34,963,740
	Std. Err.	20,009	25,487	6,975	30,934	432,369
6-9	Sample Size	84	141	17	104	21,752
	Wgt'd Count	223,208	364,924	27,992	224,892	47,908,530
	Std. Err.	35,457	51,621	10,090	37,069	487,685
10+	Sample Size	169	381	36	111	17,813
	Wgt'd Count	511,696	818,653	65,852	286,599	46,724,355
	Std. Err.	58,717	67,925	18,505	39,831	571,722
Unknown	Sample Size	19	42	10	579	2,569
	Wgt'd Count	51,753	77,237	14,282	1,416,774	6,122,388
	Std. Err.	17,108	23,769	6,482	103,993	222,474
All	Sample Size	333	742	82	936	75,217
	Wgt'd Count	924,122	1,658,514	148,884	2,280,102	176,066,658
	Std. Err.	75,920	111,978	25,033	128,561	879,799

Standard Table 3: Number of Persons 5 Years and Older in Households, by Age and Sex

		Sex		
		Male	Female	All
Age				
5-15	Sample Size	8,765	8,317	17,082
	Wgt'd Count	22,009,186	21,082,782	43,091,967
	Std. Err.	426,932	425,096	675,339
16-19	Sample Size	2,434	2,459	4,893
	Wgt'd Count	7,293,958	6,780,403	14,074,361
	Std. Err.	237,543	213,002	329,870
20-24	Sample Size	2,277	2,657	4,934
	Wgt'd Count	7,994,320	8,133,391	16,127,711
	Std. Err.	277,694	256,811	407,886
25-34	Sample Size	6,732	7,807	14,539
	Wgt'd Count	21,475,536	21,890,424	43,365,960
	Std. Err.	402,030	373,413	625,186
35-44	Sample Size	8,481	9,513	17,994
	Wgt'd Count	20,968,000	21,361,000	42,329,000
	Std. Err.	336,633	329,615	549,090
45-54	Sample Size	6,595	7,427	14,022
	Wgt'd Count	15,166,970	15,893,004	31,059,974
	Std. Err.	267,211	262,387	438,923
55-64	Sample Size	4,347	4,858	9,205
	Wgt'd Count	9,726,030	10,650,996	20,377,026
	Std. Err.	222,331	224,905	367,185
65+	Sample Size	5,528	7,163	12,691
	Wgt'd Count	13,002,000	18,247,000	31,249,000
	Std. Err.	253,598	317,219	460,404

(CONTINUED)

Standard Table 3: Number of Persons 5 Years and Older in Households, by Age and Sex

		Sex		
		Male	Female	All
Age				
65+				
All	Sample Size	45,159	50,201	95,360
	Wgt'd Count	117,636,000	124,039,000	241,675,000
	Std. Err.	807,746	778,374	1,281,055

Standard Table 4: Number of Drivers, by Annual Miles Driven, Age and Sex

Sex: Male		Annual Miles Driven				
		Under 5000	5,000 to 9,999	10,000 to 14,999	15,000 to 24,999	25,000 to 39,999
Age						
16-24	Sample Size	1,354	510	570	634	243
	Wgt'd Count	4,410,085	1,736,692	1,697,006	2,338,303	841,777
	Std. Err.	185,254	135,366	108,905	149,511	90,594
25-44	Sample Size	1,940	1,551	3,248	4,173	1,947
	Wgt'd Count	6,224,506	4,134,362	8,727,653	11,433,643	5,039,353
	Std. Err.	214,016	166,944	244,919	276,577	185,790
45-64	Sample Size	1,385	1,429	2,527	2,937	1,261
	Wgt'd Count	3,403,874	3,271,227	5,329,002	6,318,490	3,045,649
	Std. Err.	138,609	130,123	162,423	175,369	132,384
65 and over	Sample Size	1,226	1,270	1,232	763	196
	Wgt'd Count	3,194,002	2,891,182	2,673,819	1,791,150	443,440
	Std. Err.	136,144	125,271	113,422	100,363	47,316
All	Sample Size	5,905	4,760	7,577	8,507	3,647
	Wgt'd Count	17,232,467	12,033,463	18,427,480	21,881,587	9,370,219
	Std. Err.	344,937	278,617	323,699	360,601	254,636

(CONTINUED)

Standard Table 4: Number of Drivers, by Annual Miles Driven, Age and Sex

Sex: Male		Annual Miles Driven		
		40,000 and over	Not Determined	All
Age				
16-24	Sample Size	131	280	3,722
	Wgt'd Count	543,138	868,779	12,435,780
	Std. Err.	70,713	79,107	328,787
25-44	Sample Size	1,144	545	14,548
	Wgt'd Count	3,440,979	1,501,080	40,501,576
	Std. Err.	159,201	98,584	472,101
45-64	Sample Size	638	367	10,544
	Wgt'd Count	1,529,570	975,152	23,872,964
	Std. Err.	91,624	76,724	323,162
65 and over	Sample Size	74	190	4,951
	Wgt'd Count	181,735	494,015	11,669,343
	Std. Err.	32,446	54,578	242,161
All	Sample Size	1,987	1,382	33,765
	Wgt'd Count	5,695,422	3,839,025	88,479,663
	Std. Err.	199,091	164,906	595,958

Standard Table 4: Number of Drivers, by Annual Miles Driven, Age and Sex

Sex: Female		Annual Miles Driven				
		Under 5000	5,000 to 9,999	10,000 to 14,999	15,000 to 24,999	25,000 to 39,999
Age						
16-24	Sample Size	1,580	511	634	486	165
	Wgt'd Count	4,681,836	1,473,745	1,866,394	1,413,835	559,981
	Std. Err.	186,913	94,940	112,543	99,962	63,593
25-44	Sample Size	3,728	2,761	3,997	3,227	966
	Wgt'd Count	10,157,320	6,383,791	9,360,803	8,042,375	2,371,428
	Std. Err.	254,923	188,110	227,712	235,643	126,249
45-64	Sample Size	3,323	2,330	2,557	1,606	437
	Wgt'd Count	7,712,126	4,844,906	5,112,526	3,331,132	831,500
	Std. Err.	197,054	149,217	151,116	127,057	67,582
65 and over	Sample Size	2,791	1,031	491	172	42
	Wgt'd Count	7,205,205	2,489,823	1,213,391	392,345	103,135
	Std. Err.	205,431	117,512	81,993	45,201	22,529
All	Sample Size	11,422	6,633	7,679	5,491	1,610
	Wgt'd Count	29,756,487	15,192,265	17,553,113	13,179,687	3,866,045
	Std. Err.	411,046	274,754	297,259	284,694	158,824

(CONTINUED)

Standard Table 4: Number of Drivers, by Annual Miles Driven, Age and Sex

Sex: Female		Annual Miles Driven		
		40,000 and over	Not Determined	All
Age				
16-24	Sample Size	58	491	3,925
	Wgt'd Count	218,304	1,344,497	11,558,593
	Std. Err.	43,857	94,497	289,538
25-44	Sample Size	312	1,047	16,038
	Wgt'd Count	937,720	2,593,863	39,847,300
	Std. Err.	79,541	128,849	433,874
45-64	Sample Size	109	776	11,138
	Wgt'd Count	306,265	1,769,119	23,907,574
	Std. Err.	49,237	93,965	310,427
65 and over	Sample Size	10	473	5,010
	Wgt'd Count	12,954	1,120,428	12,537,281
	Std. Err.	6,391	76,135	258,765
All	Sample Size	489	2,787	36,111
	Wgt'd Count	1,475,243	6,827,907	87,850,748
	Std. Err.	104,967	201,907	524,587

Standard Table 4: Number of Drivers, by Annual Miles Driven, Age and Sex

Sex: All		Annual Miles Driven				
		Under 5000	5,000 to 9,999	10,000 to 14,999	15,000 to 24,999	25,000 to 39,999
Age						
16-24	Sample Size	2,934	1,021	1,204	1,120	408
	Wgt'd Count	9,091,921	3,210,437	3,563,400	3,752,138	1,401,758
	Std. Err.	271,372	167,676	159,934	188,173	111,019
25-44	Sample Size	5,668	4,312	7,245	7,400	2,913
	Wgt'd Count	16,381,826	10,518,153	18,088,455	19,476,018	7,410,782
	Std. Err.	363,741	262,571	349,466	383,378	232,875
45-64	Sample Size	4,708	3,759	5,084	4,543	1,698
	Wgt'd Count	11,116,000	8,116,133	10,441,528	9,649,622	3,877,150
	Std. Err.	260,953	206,975	231,759	226,926	151,013
65 and over	Sample Size	4,017	2,301	1,723	935	238
	Wgt'd Count	10,399,207	5,381,006	3,887,210	2,183,495	546,576
	Std. Err.	259,060	179,037	141,776	112,815	53,500
All	Sample Size	17,327	11,393	15,256	13,998	5,257
	Wgt'd Count	46,988,954	27,225,728	35,980,593	35,061,274	13,236,265
	Std. Err.	576,777	405,118	452,121	478,611	307,135

(CONTINUED)

Standard Table 4: Number of Drivers, by Annual Miles Driven, Age and Sex

Sex: All		Annual Miles Driven		
		40,000 and over	Not Determined	All
Age				
16-24	Sample Size	189	771	7,647
	Wgt'd Count	761,442	2,213,276	23,994,373
	Std. Err.	94,635	127,867	468,026
25-44	Sample Size	1,456	1,592	30,586
	Wgt'd Count	4,378,699	4,094,943	80,348,876
	Std. Err.	186,315	174,110	746,759
45-64	Sample Size	747	1,143	21,682
	Wgt'd Count	1,835,835	2,744,270	47,780,537
	Std. Err.	106,194	132,429	530,098
65 and over	Sample Size	84	663	9,961
	Wgt'd Count	194,689	1,614,443	24,206,625
	Std. Err.	33,066	97,986	400,076
All	Sample Size	2,476	4,169	69,876
	Wgt'd Count	7,170,665	10,666,932	176,330,411
	Std. Err.	240,705	288,720	846,177

Standard Table 5: Number of Workers, by Work Trip Time and MSA Size

		Work Trip Time				
		10 Minutes or less	11-20 Minutes	21-30 Minutes	31-60 Minutes	60 Minutes and over
MSA Size Less than 250,000	Sample Size	1,761	1,418	507	349	103
	Wgt'd Count	3,805,852	3,330,943	1,135,266	676,470	145,037
	Std. Err.	172,522	148,123	83,755	62,922	34,902
250,000 to 499,999	Sample Size	1,045	1,029	423	238	38
	Wgt'd Count	2,847,095	3,181,592	1,334,859	719,964	117,533
	Std. Err.	133,864	147,161	93,811	61,951	27,762
500,000 to 999,999	Sample Size	1,946	2,122	981	640	63
	Wgt'd Count	3,236,418	3,628,162	1,669,896	1,138,615	120,200
	Std. Err.	139,880	172,589	96,815	75,990	21,321
1,000,000 to 2,999,999	Sample Size	2,676	3,371	1,726	984	81
	Wgt'd Count	5,787,105	7,649,935	3,853,052	2,758,811	223,604
	Std. Err.	191,826	221,913	150,527	131,517	40,710
3,000,000 or more	Sample Size	4,621	5,025	3,235	4,324	1,007
	Wgt'd Count	10,870,401	13,534,416	8,740,497	11,467,704	1,920,325
	Std. Err.	297,256	326,394	249,646	323,987	111,118
Not in an MSA	Sample Size	2,751	1,726	876	778	119
	Wgt'd Count	10,312,006	5,558,876	2,791,842	2,733,697	389,712
	Std. Err.	266,179	189,008	145,363	139,998	45,729
All	Sample Size	14,800	14,691	7,748	7,313	1,411
	Wgt'd Count	36,858,877	36,883,924	19,525,412	19,495,261	2,916,410
	Std. Err.	493,620	489,556	354,564	388,451	135,680

(CONTINUED)

Standard Table 5: Number of Workers, by Work Trip Time and MSA Size

		Work Trip Time	
		Not Determined	All
MSA Size			
Less than 250,000	Sample Size	76	4,214
	Wgt'd Count	160,891	9,254,458
	Std. Err.	30,410	277,955
250,000 to 499,999	Sample Size	31	2,804
	Wgt'd Count	79,098	8,280,141
	Std. Err.	19,142	249,939
500,000 to 999,999	Sample Size	73	5,825
	Wgt'd Count	123,893	9,917,185
	Std. Err.	21,694	276,390
1,000,000 to 2,999,999	Sample Size	113	8,951
	Wgt'd Count	351,980	20,624,487
	Std. Err.	53,310	360,931
3,000,000 or more	Sample Size	337	18,549
	Wgt'd Count	993,762	47,527,103
	Std. Err.	93,145	650,281
Not in an MSA	Sample Size	86	6,336
	Wgt'd Count	356,877	22,143,010
	Std. Err.	48,627	363,079
All	Sample Size	716	46,679
	Wgt'd Count	2,066,501	117,746,384
	Std. Err.	124,886	832,649

Standard Table 6: Number of Travel Day Person Trips in Thousands, by Mode and Purpose

		Transportation Mode				
		POV	Bus	Train	Streetcar/Su- bway	Bike/Walk
Trip Purpose						
Go to work	Sample Size	32,461	706	245	516	1,130
	Wgt'd Count	29,565,078	665,127	193,734	395,064	943,177
	Std. Err.	317,936	42,243	19,136	29,869	50,309
Work business	Sample Size	10,277	83	16	61	320
	Wgt'd Count	9,510,868	81,846	8,565	34,940	289,551
	Std. Err.	280,213	25,875	3,439	6,914	31,237
Return work	Sample Size	5,989	28	3	10	775
	Wgt'd Count	5,705,248	22,477	1,890	3,460	703,043
	Std. Err.	141,047	6,265	1,544	1,508	49,502
Shopping	Sample Size	50,637	421	31	119	3,068
	Wgt'd Count	47,171,380	370,806	25,527	83,634	2,937,703
	Std. Err.	557,820	32,781	7,357	11,062	121,102
School	Sample Size	6,787	355	31	81	1,353
	Wgt'd Count	6,739,078	312,219	19,702	66,303	1,413,742
	Std. Err.	178,317	30,663	5,049	11,214	82,146
Religious	Sample Size	5,500	66	6	15	336
	Wgt'd Count	5,612,318	75,275	1,694	11,651	279,971
	Std. Err.	192,875	18,199	929	3,968	32,558
Medical/Dental	Sample Size	3,642	137	10	35	122
	Wgt'd Count	3,086,476	136,450	7,283	26,671	106,272

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.
 Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail.
 Other includes airplane, taxi, and other modes.

Standard Table 6: Number of Travel Day Person Trips in Thousands, by Mode and Purpose

		Transportation Mode				
		POV	Bus	Train	Streetcar/Su- bway	Bike/Walk
Trip Purpose						
Medical/Dental	Std. Err.	105,389	20,362	2,953	7,797	15,182
Other Business	Sample Size	36,245	413	62	168	2,321
	Wgt'd Count	32,956,534	408,596	38,716	100,816	2,102,495
	Std. Err.	453,373	38,425	7,092	12,105	81,204
Pick up/Drop off	Sample Size	26,298	96	10	26	600
	Wgt'd Count	24,146,940	98,474	12,856	18,097	510,796
	Std. Err.	413,723	18,782	5,105	5,284	41,524
Vacation	Sample Size	592	25	5	13	34
	Wgt'd Count	586,044	35,876	2,686	641	35,385
	Std. Err.	75,152	17,691	1,871	621	17,274
Visit	Sample Size	16,438	254	43	101	1,999
	Wgt'd Count	16,064,932	253,419	39,555	79,571	2,117,138
	Std. Err.	283,931	30,242	9,467	12,530	104,047
Out to eat	Sample Size	16,700	84	5	40	1,403
	Wgt'd Count	16,221,203	74,200	2,423	23,910	1,366,968
	Std. Err.	271,019	12,795	1,927	5,960	77,458
Other Social	Sample Size	21,902	291	29	132	2,403
	Wgt'd Count	20,367,785	295,202	30,705	92,612	2,505,930
	Std. Err.	367,669	36,054	9,099	15,778	121,045

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.
 Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail.
 Other includes airplane, taxi, and other modes.

Standard Table 6: Number of Travel Day Person Trips in Thousands, by Mode and Purpose

		Transportation Mode				
		POV	Bus	Train	Streetcar/Su- bway	Bike/Walk
Trip Purpose Other	Sample Size	437	22	1	4	45
	Wgt'd Count	455,669	14,611	385	3,117	49,270
	Std. Err.	44,946	5,676	385	3,033	13,647
To go home	Sample Size	118,228	1,700	318	719	8,310
	Wgt'd Count	109,178,579	1,696,795	261,280	531,596	8,305,383
	Std. Err.	821,177	82,206	23,593	36,238	231,893
Unknown	Sample Size	38				2
	Wgt'd Count	31,831				96
	Std. Err.	11,763				82
All	Sample Size	352,171	4,681	815	2,040	24,221
	Wgt'd Count	327,399,963	4,541,375	647,002	1,472,083	23,666,921
	Std. Err.	2,390,405	193,292	49,852	81,097	553,543

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.
 Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail.
 Other includes airplane, taxi, and other modes.

Standard Table 6: Number of Travel Day Person Trips in Thousands, by Mode and Purpose

		Transportation Mode			
		School Bus	Other	Not determined	All
Trip Purpose					
Go to work	Sample Size	126	241	856	36,281
	Wgt'd Count	103,865	197,417	703,401	32,766,863
	Std. Err.	38,681	23,565	44,509	337,955
Work business	Sample Size	118	355	314	11,544
	Wgt'd Count	92,989	331,526	272,469	10,622,753
	Std. Err.	27,571	55,368	37,112	297,050
Return work	Sample Size	20	107	297	7,229
	Wgt'd Count	9,723	104,437	227,123	6,777,402
	Std. Err.	3,514	21,134	22,948	154,624
Shopping	Sample Size	64	95	1,891	56,326
	Wgt'd Count	49,887	99,684	1,648,190	52,386,811
	Std. Err.	10,082	21,343	93,365	585,359
School	Sample Size	4,121	32	544	13,304
	Wgt'd Count	3,075,847	16,929	518,064	12,161,884
	Std. Err.	117,127	5,329	48,979	253,299
Religious	Sample Size	3	14	140	6,080
	Wgt'd Count	2,028	16,435	120,239	6,119,612
	Std. Err.	1,688	9,156	18,764	199,564
Medical/Dental	Sample Size	2	63	73	4,084
	Wgt'd Count	3,637	49,706	69,941	3,486,435

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Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes. Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail. Other includes airplane, taxi, and other modes.

Standard Table 6: Number of Travel Day Person Trips in Thousands, by Mode and Purpose

		Transportation Mode			
		School Bus	Other	Not determined	All
Trip Purpose					
Medical/Dental	Std. Err.	3,590	11,347	13,686	111,281
Other Business	Sample Size	278	241	1,510	41,238
	Wgt'd Count	216,293	208,842	1,277,507	37,309,798
	Std. Err.	32,858	27,765	72,921	483,631
Pick up/Drop off	Sample Size	66	62	504	27,662
	Wgt'd Count	60,466	37,418	474,864	25,359,912
	Std. Err.	14,768	8,473	49,228	421,522
Vacation	Sample Size		45	35	749
	Wgt'd Count		27,552	28,541	716,726
	Std. Err.		8,444	13,562	85,359
Visit	Sample Size	77	123	1,301	20,336
	Wgt'd Count	41,486	125,676	1,282,042	20,003,821
	Std. Err.	9,306	20,297	74,477	327,732
Out to eat	Sample Size	22	88	684	19,026
	Wgt'd Count	18,507	99,920	559,598	18,366,730
	Std. Err.	6,126	22,077	40,233	286,834
Other Social	Sample Size	253	259	1,136	26,405
	Wgt'd Count	173,140	233,133	1,122,184	24,820,691
	Std. Err.	21,757	33,375	92,898	430,840

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes. Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail. Other includes airplane, taxi, and other modes.

Standard Table 6: Number of Travel Day Person Trips in Thousands, by Mode and Purpose

		Transportation Mode			
		School Bus	Other	Not determined	All
Trip Purpose					
Other	Sample Size	9	17	77	612
	Wgt'd Count	14,323	16,484	54,344	608,204
	Std. Err.	7,512	6,678	14,055	51,477
To go home	Sample Size	3,645	680	4,477	138,077
	Wgt'd Count	2,736,803	570,678	4,092,428	127,373,544
	Std. Err.	102,905	41,198	150,614	929,594
Unknown	Sample Size	3		29	72
	Wgt'd Count	272		16,980	49,179
	Std. Err.	272		5,741	13,118
All	Sample Size	8,807	2,422	13,868	409,025
	Wgt'd Count	6,599,267	2,135,838	12,467,914	378,930,363
	Std. Err.	230,671	129,544	393,987	2,645,115

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes. Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail. Other includes airplane, taxi, and other modes.

Standard Table 7: Average Number of Travel Day Trips per Person, by Age and Sex

	Taylor SE Ratio		
	Sex		
	Males	Females	All
Age			
5-15	0.05	0.05	0.04
16-19	0.10	0.09	0.07
20-24	0.09	0.09	0.06
25-34	0.05	0.06	0.04
35-44	0.05	0.05	0.04
45-54	0.06	0.06	0.04
55-64	0.08	0.07	0.05
65 and over	0.07	0.05	0.04
All	0.02	0.02	0.02

Standard Errors of Cell Percents

	Taylor SE		
	Sex		
	Males	Females	All
Age			
5-15	0.16	0.17	0.24
16-19	0.12	0.11	0.16
20-24	0.13	0.13	0.20
25-34	0.20	0.20	0.30
35-44	0.17	0.17	0.26
45-54	0.14	0.14	0.22
55-64	0.13	0.11	0.19
65 and over	0.13	0.13	0.21
All	0.25	0.25	0.00

Standard Errors of Row Percents

	Taylor SE		
	Sex		
	Males	Females	All
Age			
5-15	0.32	0.30	0.24
16-19	0.24	0.21	0.16
20-24	0.26	0.26	0.20
25-34	0.40	0.37	0.30
35-44	0.34	0.33	0.26
45-54	0.28	0.27	0.22
55-64	0.26	0.21	0.19
65 and over	0.26	0.26	0.21
All	0.00	0.00	0.00

Standard Errors of Column Percents

	Taylor SE		
	Sex		
	Males	Females	All
Age			
5-15	0.73	0.73	0.00
16-19	1.29	1.29	0.00
20-24	1.29	1.29	0.00
25-34	0.67	0.67	0.00
35-44	0.55	0.55	0.00
45-54	0.63	0.63	0.00
55-64	0.87	0.87	0.00
65 and over	0.76	0.76	0.00
All	0.25	0.25	0.00

Standard Table 8: Travel Day Person Miles in Thousands, by Mode and Purpose

		Transportation Mode				
		POV trips	Bus trips	Train trips	Streetcar/Su- bway	Bike/Walk
Trip Purpose						
Go to work	Sample Size	32,215	633	207	429	1,129
	Wgt'd Count	346,557,523	6,076,688	4,270,407	3,467,256	967,568
	Std. Err.	6,303,288	646,740	461,720	325,999	120,699
Work-related business	Sample Size	10,166	67	16	52	320
	Wgt'd Count	174,484,786	1,118,393	853,582	228,560	165,231
	Std. Err.	9,474,438	471,713	691,593	72,860	24,098
Return to work	Sample Size	5,952	23	3	10	775
	Wgt'd Count	37,331,371	63,241	9,858	8,832	260,040
	Std. Err.	2,053,118	25,221	7,867	4,397	23,790
Shopping	Sample Size	50,170	379	21	100	3,067
	Wgt'd Count	298,607,940	1,649,678	295,085	584,679	1,479,184
	Std. Err.	9,141,308	195,766	135,666	118,875	94,389
School	Sample Size	6,699	311	19	66	1,352
	Wgt'd Count	43,655,757	2,429,553	104,876	605,003	822,345
	Std. Err.	2,564,841	538,235	41,397	143,607	71,373
Religious activity	Sample Size	5,421	57	2	11	336
	Wgt'd Count	36,367,291	845,549	5,873	96,018	124,139
	Std. Err.	2,247,578	307,396	4,272	40,557	17,111
Medical/Dental	Sample Size	3,591	125	5	30	122
	Wgt'd Count	31,750,541	757,008	64,271	117,243	90,010

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Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.
 Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail.
 Other includes airplane, taxi, and other modes.

Standard Table 8: Travel Day Person Miles in Thousands, by Mode and Purpose

		Transportation Mode				
		POV trips	Bus trips	Train trips	Streetcar/Su- bway	Bike/Walk
Trip Purpose						
Medical/Dental	Std. Err.	1,799,579	172,093	48,058	34,630	18,961
Other	Sample Size	35,906	365	50	143	2,318
Family/Personal	Wgt'd Count	258,284,250	3,578,525	995,338	645,314	1,182,299
Business	Std. Err.	15,055,639	783,014	410,110	116,938	75,294
Pick up/Drop off someone	Sample Size	25,961	89	10	17	599
	Wgt'd Count	184,682,650	1,602,728	245,087	97,250	252,766
	Std. Err.	6,132,547	572,157	112,429	43,275	30,934
Vacation	Sample Size	566	22	3	13	34
	Wgt'd Count	44,970,187	1,926,947	75,065	1,944	47,048
	Std. Err.	6,870,102	1,268,767	75,042	1,865	36,800
Visit Friends and Relatives	Sample Size	16,157	222	30	74	1,997
	Wgt'd Count	233,347,618	1,461,460	1,324,311	734,198	1,200,902
	Std. Err.	11,928,337	289,060	550,204	153,700	87,282
Go out to eat	Sample Size	16,531	77	3	34	1,403
	Wgt'd Count	119,346,891	1,296,740	5,352	101,986	601,020
	Std. Err.	5,368,341	550,662	4,590	31,987	53,956
Other	Sample Size	21,606	256	18	109	2,394
Social/Recreation- al	Wgt'd Count	240,889,112	6,920,956	835,123	628,712	2,319,949
	Std. Err.	9,360,740	1,496,730	438,629	153,243	223,241

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.
 Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail.
 Other includes airplane, taxi, and other modes.

Standard Table 8: Travel Day Person Miles in Thousands, by Mode and Purpose

		Transportation Mode				
		POV trips	Bus trips	Train trips	Streetcar/Su- bway	Bike/Walk
Trip Purpose						
Other	Sample Size	422	18	1	4	45
	Wgt'd Count	8,134,724	86,135	24,612	9,148	38,454
	Std. Err.	2,130,147	50,522	24,612	9,097	17,067
To go home	Sample Size	117,097	1,507	243	589	8,297
	Wgt'd Count	1,050,261,778	18,214,020	5,052,816	4,725,510	5,855,649
	Std. Err.	16,731,938	2,637,759	604,317	397,851	254,385
Not Determined	Sample Size	37				1
	Wgt'd Count	1,576,852				74
	Std. Err.	1,382,833				74
All	Sample Size	348,497	4,151	631	1,681	24,189
	Wgt'd Count	3,110,249,271	48,027,620	14,161,655	12,051,654	15,406,676
	Std. Err.	41,606,033	4,610,323	1,566,400	854,320	560,832

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.
 Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail.
 Other includes airplane, taxi, and other modes.

Standard Table 8: Travel Day Person Miles in Thousands, by Mode and Purpose

		Transportation Mode			
		School Bus	Other	Not determined	All
Trip Purpose					
Go to work	Sample Size	119	223	735	35,690
	Wgt'd Count	1,485,499	4,065,169	3,288,172	370,178,282
	Std. Err.	491,016	1,167,091	405,944	6,508,798
Work-related business	Sample Size	117	313	240	11,291
	Wgt'd Count	1,050,244	30,164,054	1,928,593	209,993,444
	Std. Err.	394,644	6,526,334	962,610	11,679,137
Return to work	Sample Size	19	104	288	7,174
	Wgt'd Count	244,056	1,623,956	144,068	39,685,422
	Std. Err.	156,542	596,486	51,639	2,146,445
Shopping	Sample Size	63	92	1,731	55,623
	Wgt'd Count	245,901	3,384,633	3,022,043	309,269,143
	Std. Err.	65,154	2,180,670	426,425	9,455,253
School	Sample Size	3,998	27	496	12,968
	Wgt'd Count	18,314,571	127,755	600,878	66,660,738
	Std. Err.	1,066,258	78,918	135,321	2,923,210
Religious activity	Sample Size	3	14	123	5,967
	Wgt'd Count	9,777	201,823	267,084	37,917,554
	Std. Err.	8,396	171,663	100,594	2,279,135
Medical/Dental	Sample Size	2	59	60	3,994
	Wgt'd Count	64,710	495,622	372,248	33,711,653

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes. Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail. Other includes airplane, taxi, and other modes.

Standard Table 8: Travel Day Person Miles in Thousands, by Mode and Purpose

		Transportation Mode			
		School Bus	Other	Not determined	All
Trip Purpose					
Medical/Dental	Std. Err.	64,616	244,765	129,055	1,835,400
Other	Sample Size	270	210	1,378	40,640
Family/Personal	Wgt'd Count	1,107,997	26,132,043	3,144,263	295,070,028
Business	Std. Err.	173,895	11,485,373	556,166	20,913,197
Pick up/Drop off someone	Sample Size	59	59	465	27,259
	Wgt'd Count	578,021	917,039	1,341,778	189,717,319
	Std. Err.	239,712	646,727	237,516	6,205,333
Vacation	Sample Size		37	34	709
	Wgt'd Count		5,114,756	11,353	52,147,301
	Std. Err.		3,036,004	5,537	7,633,321
Visit Friends and Relatives	Sample Size	72	100	1,192	19,844
	Wgt'd Count	193,056	16,402,849	1,919,538	256,583,932
	Std. Err.	47,826	5,563,328	448,099	13,446,428
Go out to eat	Sample Size	21	81	616	18,766
	Wgt'd Count	217,422	766,778	630,307	122,966,496
	Std. Err.	156,481	295,212	128,834	5,409,118
Other	Sample Size	236	233	1,033	25,885
Social/Recreational	Wgt'd Count	3,258,172	12,593,319	4,193,710	271,639,053
	Std. Err.	739,097	7,446,963	2,051,053	12,296,004

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes. Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail. Other includes airplane, taxi, and other modes.

Standard Table 8: Travel Day Person Miles in Thousands, by Mode and Purpose

		Transportation Mode			
		School Bus	Other	Not determined	All
Trip Purpose					
Other	Sample Size	8	17	35	550
	Wgt'd Count	96,208	4,160,487	85,383	12,635,149
	Std. Err.	59,232	4,090,459	56,083	4,612,999
To go home	Sample Size	3,512	593	4,058	135,896
	Wgt'd Count	16,524,827	27,608,357	13,107,921	1,141,350,876
	Std. Err.	964,433	6,807,947	2,319,308	18,539,985
Not Determined	Sample Size	3		1	42
	Wgt'd Count	584		17,909	1,595,419
	Std. Err.	584		17,909	1,382,952
All	Sample Size	8,502	2,162	12,485	402,298
	Wgt'd Count	43,391,046	133,758,641	34,075,246	3,411,121,810
	Std. Err.	2,297,533	19,973,342	4,793,884	49,131,000

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes. Train includes Amtrak and commuter train. Streetcar/subway includes trolley and elevated rail. Other includes airplane, taxi, and other modes.

Standard Table 9: Travel Day Vehicle Trips in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)				
		<=5	6-10	11-15	16-20	21-30
Trip Purpose	Sample Size					
	Wgt'd Count					
	Std. Err.					
Go to work	Sample Size	11,956	6,436	3,961	2,397	2,425
	Wgt'd Count	10,860,847	5,807,096	3,439,277	2,150,574	2,274,746
	Std. Err.	183,838	128,074	91,369	71,270	79,914
Work-related business	Sample Size	4,388	1,559	923	600	598
	Wgt'd Count	3,978,795	1,447,328	899,818	576,982	555,374
	Std. Err.	166,230	72,469	52,600	42,735	44,172
Return to work	Sample Size	3,914	765	243	98	106
	Wgt'd Count	3,676,330	683,192	247,891	98,037	97,671
	Std. Err.	106,717	41,672	28,624	15,920	14,822
Shopping	Sample Size	27,506	5,161	1,814	851	746
	Wgt'd Count	25,112,540	4,640,639	1,663,301	722,465	710,098
	Std. Err.	305,251	117,844	65,090	39,868	39,550
School	Sample Size	1,244	441	233	178	126
	Wgt'd Count	1,303,104	518,435	241,853	163,218	150,307
	Std. Err.	72,016	45,402	25,235	23,606	23,356
Religious activity	Sample Size	2,037	535	175	78	56
	Wgt'd Count	1,998,436	509,663	264,838	76,952	51,864
	Std. Err.	79,123	33,697	32,306	13,096	9,118
Medical/Dental	Sample Size	1,295	551	240	138	122
	Wgt'd Count	1,047,755	484,056	184,480	122,964	116,612
	Std. Err.	51,971	32,579	20,103	17,666	17,564

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 9: Travel Day Vehicle Trips in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)					
		<=5	6-10	11-15	16-20	21-30	
Trip Purpose	Other	Sample Size	18,013	3,879	1,550	725	631
	Family/Personal	Wgt'd Count	16,185,137	3,487,881	1,446,604	713,965	598,631
	Business	Std. Err.	262,070	104,334	58,820	42,554	36,877
Pick up/Drop off someone	Sample Size	13,787	3,772	1,559	694	657	
	Wgt'd Count	12,219,962	3,446,534	1,384,529	714,173	648,342	
	Std. Err.	240,223	108,024	67,430	45,987	40,096	
Vacation	Sample Size	58	23	19	7	10	
	Wgt'd Count	41,934	22,920	20,876	9,892	4,039	
	Std. Err.	10,564	7,551	6,391	4,312	2,275	
Visit Friends and Relatives	Sample Size	5,370	1,882	915	489	499	
	Wgt'd Count	5,245,211	1,827,860	937,307	505,385	513,862	
	Std. Err.	133,212	72,571	47,757	33,364	35,006	
Go out to eat	Sample Size	6,883	1,506	570	256	217	
	Wgt'd Count	6,586,230	1,476,948	547,883	248,593	212,633	
	Std. Err.	129,093	59,099	36,428	24,936	24,566	
Other Social/Recreation- al	Sample Size	5,497	2,036	922	498	459	
	Wgt'd Count	5,152,777	1,811,334	856,646	441,669	439,386	
	Std. Err.	122,588	66,467	45,657	31,726	31,110	
Other	Sample Size	98	34	18	10	13	
	Wgt'd Count	101,293	35,019	15,300	10,128	13,832	
	Std. Err.	15,507	7,875	5,030	4,304	6,086	
To go home	Sample Size	48,934	15,546	7,388	4,018	3,811	

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 9: Travel Day Vehicle Trips in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)				
		<=5	6-10	11-15	16-20	21-30
Trip Purpose						
To go home	Wgt'd Count	44,682,108	13,947,497	6,799,182	3,655,082	3,620,509
	Std. Err.	429,620	200,242	138,357	93,052	98,541
Not Determined	Sample Size	15	2		2	3
	Wgt'd Count	10,488	163		178	3,639
	Std. Err.	6,410	163		178	2,605
All	Sample Size	150,995	44,128	20,530	11,039	10,479
	Wgt'd Count	138,202,948	40,146,565	18,949,784	10,210,258	10,011,545
	Std. Err.	1,183,996	486,945	303,184	211,383	217,413

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 9: Travel Day Vehicle Trips in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)		
		31+	Not Determined	All
Trip Purpose				
Go to work	Sample Size	2,180	190	29,545
	Wgt'd Count	1,903,141	169,413	26,605,095
	Std. Err.	78,766	22,752	290,847
Work-related business	Sample Size	1,009	74	9,151
	Wgt'd Count	1,001,854	41,788	8,501,939
	Std. Err.	65,989	11,855	261,432
Return to work	Sample Size	148	30	5,304
	Wgt'd Count	152,880	19,653	4,975,653
	Std. Err.	19,886	7,847	129,605
Shopping	Sample Size	624	265	36,967
	Wgt'd Count	642,758	199,500	33,691,303
	Std. Err.	43,008	21,336	368,097
School	Sample Size	124	28	2,374
	Wgt'd Count	123,339	19,545	2,519,800
	Std. Err.	18,233	5,801	106,004
Religious activity	Sample Size	53	22	2,956
	Wgt'd Count	63,369	19,540	2,984,661
	Std. Err.	14,292	6,359	97,445
Medical/Dental	Sample Size	124	20	2,490
	Wgt'd Count	107,831	15,509	2,079,207
	Std. Err.	15,352	6,720	74,316

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 9: Travel Day Vehicle Trips in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)		
		31+	Not Determined	All
Trip Purpose				
Other	Sample Size	674	142	25,614
Family/Personal	Wgt'd Count	654,161	107,908	23,194,288
Business	Std. Err.	47,189	17,504	327,126
Pick up/Drop off someone	Sample Size	568	227	21,264
	Wgt'd Count	548,576	191,636	19,153,753
	Std. Err.	40,133	27,850	316,830
Vacation	Sample Size	116	5	238
	Wgt'd Count	110,671	4,742	215,074
	Std. Err.	16,937	4,018	26,724
Visit Friends and Relatives	Sample Size	746	104	10,005
	Wgt'd Count	768,776	99,021	9,897,421
	Std. Err.	47,195	15,746	189,400
Go out to eat	Sample Size	225	62	9,719
	Wgt'd Count	210,450	50,776	9,333,513
	Std. Err.	22,323	9,701	154,955
Other Social/Recreational	Sample Size	629	66	10,107
	Wgt'd Count	607,318	39,265	9,348,395
	Std. Err.	37,232	8,159	171,078
Other	Sample Size	24	4	201
	Wgt'd Count	15,742	4,620	195,934
	Std. Err.	4,945	2,629	21,980

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 9: Travel Day Vehicle Trips in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)		
		31+	Not Determined	All
Trip Purpose To go home	Sample Size	3,981	535	84,213
	Wgt'd Count	3,844,918	474,881	77,024,177
	Std. Err.	106,572	40,476	548,887
Not Determined	Sample Size	3		25
	Wgt'd Count	3,174		17,643
	Std. Err.	2,665		8,066
All	Sample Size	11,228	1,774	250,173
	Wgt'd Count	10,758,960	1,457,798	229,737,857
	Std. Err.	242,830	103,375	1,600,293

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 10: Travel Day Vehicle Miles in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)				
		<=5	6-10	11-15	16-20	21-30
Go to work	Sample Size	11,956	6,436	3,961	2,397	2,425
	Wgt'd Count	28,800,295	46,221,523	45,570,748	39,388,690	57,983,714
	Std. Err.	543,176	1,029,810	1,227,207	1,309,873	2,069,020
Work-related business	Sample Size	4,388	1,559	923	600	598
	Wgt'd Count	9,536,355	11,523,816	11,999,983	10,659,391	14,413,166
	Std. Err.	429,368	580,118	708,334	786,609	1,137,925
Return to work	Sample Size	3,914	765	243	98	106
	Wgt'd Count	7,941,824	5,194,618	3,324,999	1,772,099	2,515,273
	Std. Err.	283,579	325,822	394,476	283,754	388,559
Shopping	Sample Size	27,506	5,161	1,814	851	746
	Wgt'd Count	50,648,160	36,465,307	22,006,893	13,293,290	18,197,139
	Std. Err.	709,244	969,878	871,649	739,855	1,022,581
School	Sample Size	1,244	441	233	178	126
	Wgt'd Count	3,327,064	4,193,364	3,222,160	3,028,558	3,862,732
	Std. Err.	203,310	395,405	326,658	451,523	608,816
Religious activity	Sample Size	2,037	535	175	78	56
	Wgt'd Count	4,595,812	3,945,686	3,481,391	1,396,973	1,315,016
	Std. Err.	227,309	271,535	441,196	236,086	234,459
Medical/Dental	Sample Size	1,295	551	240	138	122
	Wgt'd Count	2,804,857	3,866,150	2,414,075	2,270,875	3,002,378
	Std. Err.	155,869	264,315	263,216	330,675	451,441

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 10: Travel Day Vehicle Miles in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)					
		<=5	6-10	11-15	16-20	21-30	
Trip Purpose	Other	Sample Size	18,013	3,879	1,550	725	631
	Family/Personal	Wgt'd Count	34,029,309	27,340,897	19,143,145	13,113,830	15,257,095
	Business	Std. Err.	620,797	841,515	789,815	782,082	943,127
Pick up/Drop off someone	Sample Size	13,787	3,772	1,559	694	657	
	Wgt'd Count	27,640,180	27,238,696	18,263,945	13,118,269	16,556,463	
	Std. Err.	607,754	876,898	885,162	847,131	1,037,330	
Vacation	Sample Size	58	23	19	7	10	
	Wgt'd Count	69,826	194,724	273,148	189,943	103,749	
	Std. Err.	19,697	63,908	84,380	83,756	59,030	
Visit Friends and Relatives	Sample Size	5,370	1,882	915	489	499	
	Wgt'd Count	12,565,202	14,594,013	12,517,890	9,394,550	13,406,201	
	Std. Err.	354,193	583,626	646,962	625,011	925,402	
Go out to eat	Sample Size	6,883	1,506	570	256	217	
	Wgt'd Count	14,804,986	11,469,773	7,328,491	4,620,476	5,439,327	
	Std. Err.	350,463	469,669	491,386	468,390	620,149	
Other Social/Recreation- al	Sample Size	5,497	2,036	922	498	459	
	Wgt'd Count	12,611,714	14,397,523	11,488,837	8,232,614	11,464,400	
	Std. Err.	339,404	535,275	624,837	599,194	824,904	
Other	Sample Size	98	34	18	10	13	
	Wgt'd Count	246,548	282,100	209,994	188,173	350,262	
	Std. Err.	53,263	62,523	70,086	80,794	152,664	
To go home	Sample Size	48,934	15,546	7,388	4,018	3,811	

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 10: Travel Day Vehicle Miles in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)				
		<=5	6-10	11-15	16-20	21-30
Trip Purpose						
To go home	Wgt'd Count	105,820,952	109,272,479	90,160,475	67,106,429	92,367,680
	Std. Err.	1,147,255	1,594,502	1,846,894	1,712,452	2,541,395
Not Determined	Sample Size	15	2		2	3
	Wgt'd Count	35,433	1,304		2,855	104,775
	Std. Err.	20,602	1,304		2,855	75,928
All	Sample Size	150,995	44,128	20,530	11,039	10,479
	Wgt'd Count	315,478,515	316,201,974	251,406,173	187,777,016	256,339,371
	Std. Err.	2,934,590	3,892,652	4,063,728	3,900,231	5,627,443

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 10: Travel Day Vehicle Miles in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)	
		31+	All
Trip Purpose			
Go to work	Sample Size	2,180	29,355
	Wgt'd Count	95,520,471	313,485,440
	Std. Err.	4,641,049	5,635,026
Work-related business	Sample Size	1,009	9,077
	Wgt'd Count	90,256,009	148,388,720
	Std. Err.	7,502,555	8,031,662
Return to work	Sample Size	148	5,274
	Wgt'd Count	10,160,289	30,909,102
	Std. Err.	1,538,546	1,767,521
Shopping	Sample Size	624	36,702
	Wgt'd Count	43,742,384	184,353,173
	Std. Err.	3,605,447	4,263,668
School	Sample Size	124	2,346
	Wgt'd Count	7,262,226	24,896,104
	Std. Err.	1,346,072	1,659,083
Religious activity	Sample Size	53	2,934
	Wgt'd Count	4,516,319	19,251,197
	Std. Err.	1,256,494	1,453,620
Medical/Dental	Sample Size	124	2,470
	Wgt'd Count	5,516,101	19,874,435
	Std. Err.	937,342	1,193,120

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 10: Travel Day Vehicle Miles in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)	
		31+	All
Trip Purpose			
Other	Sample Size	674	25,472
Family/Personal	Wgt'd Count	49,831,520	158,715,796
Business	Std. Err.	4,983,031	5,440,568
Pick up/Drop off someone	Sample Size	568	21,037
	Wgt'd Count	37,764,240	140,581,792
	Std. Err.	3,653,603	4,355,986
Vacation	Sample Size	116	233
	Wgt'd Count	17,858,226	18,689,616
	Std. Err.	3,077,571	3,102,905
Visit Friends and Relatives	Sample Size	746	9,901
	Wgt'd Count	67,128,827	129,606,684
	Std. Err.	5,792,040	6,033,014
Go out to eat	Sample Size	225	9,657
	Wgt'd Count	15,618,235	59,281,287
	Std. Err.	2,070,650	2,357,206
Other Social/Recreation- al	Sample Size	629	10,041
	Wgt'd Count	47,855,148	106,050,236
	Std. Err.	3,709,604	4,025,115
Other	Sample Size	24	197
	Wgt'd Count	2,207,088	3,484,164
	Std. Err.	1,126,472	1,146,542
To go home	Sample Size	3,981	83,678

(CONTINUED)

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 10: Travel Day Vehicle Miles in Thousands, by Trip Length and Purpose (POV trips)

		Trip Length (Miles)	
		31+	All
Trip Purpose			
	To go home	Wgt'd Count Std. Err.	245,747,914 8,722,655
Not Determined	Sample Size	3	25
	Wgt'd Count	138,591	282,959
	Std. Err.	109,683	139,283
All	Sample Size	11,228	248,399
	Wgt'd Count	741,123,587	2,068,326,636
	Std. Err.	19,959,601	23,782,308

Note: POV includes auto, van, utility, pickup, other truck, RV, Motorcycle, and other POV modes.

Standard Table 11: Number of Travel Period Trips in Thousands, by Travel Mode and Purpose

		Transportation Mode				
		POV Trips	Bus Trips	Amtrak Trips	Airplane Trips	Other
Trip Purpose						
Go to work	Sample Size	1,670	30	6	52	85
	Wgt'd Count	106,227	3,480	449	3,944	3,621
	Std. Err.	8,366	2,045	408	900	1,126
Work-related business	Sample Size	4,241	34	26	499	89
	Wgt'd Count	279,372	1,887	937	30,234	5,352
	Std. Err.	10,911	649	426	2,714	1,302
Shopping	Sample Size	1,206	18	1	1	12
	Wgt'd Count	93,862	1,048	170	42	566
	Std. Err.	5,705	462	170	42	259
School	Sample Size	229	31	2	4	28
	Wgt'd Count	19,223	2,246	265	205	2,214
	Std. Err.	2,895	850	192	145	764
Religious activity	Sample Size	207	15		2	5
	Wgt'd Count	17,541	1,757		22	160
	Std. Err.	2,639	1,041		19	105
Medical/Dental	Sample Size	549	9		1	10
	Wgt'd Count	46,669	511		3	597
	Std. Err.	4,764	303		3	279
Other	Sample Size	2,829	43	14	104	23
Family/Personal Business	Wgt'd Count	190,376	2,798	625	7,444	1,383
	Std. Err.	8,861	718	211	1,341	444
Pick up/Drop off someone	Sample Size	1,040	6		6	4
	Wgt'd Count	73,122	1,320		603	82

(CONTINUED)

Standard Table 11: Number of Travel Period Trips in Thousands, by Travel Mode and Purpose

		Transportation Mode				
		POV Trips	Bus Trips	Amtrak Trips	Airplane Trips	Other
Trip Purpose						
Pick up/Drop off someone	Std. Err.	4,720	930		274	54
Vacation	Sample Size	1,677	24	4	191	18
	Wgt'd Count	109,452	1,516	233	14,023	1,314
	Std. Err.	6,420	493	164	1,916	502
Visit Friends and Relatives	Sample Size	7,299	79	34	242	52
	Wgt'd Count	488,980	4,934	3,208	16,219	2,997
	Std. Err.	13,212	1,254	1,084	2,007	745
Go out to eat	Sample Size	83				1
	Wgt'd Count	5,230				81
	Std. Err.	979				81
Other	Sample Size	5,774	202	14	164	118
Social/Recreational	Wgt'd Count	385,334	13,002	759	10,789	7,538
	Std. Err.	11,267	1,515	345	1,554	1,256
Other	Sample Size	411	16	2	17	47
	Wgt'd Count	23,025	989	102	888	2,580
	Std. Err.	2,323	376	81	367	894
Not Determined	Sample Size	7				
	Wgt'd Count	471				
	Std. Err.	231				
All	Sample Size	27,222	507	103	1,283	492
	Wgt'd Count	1,838,884	35,488	6,748	84,416	28,485
	Std. Err.	28,489	3,580	1,344	4,753	2,699

(CONTINUED)

Standard Table 11: Number of Travel Period Trips in Thousands, by Travel Mode and Purpose

		Transportation Mode	
		Not Determined	All
Trip Purpose			
Go to work	Sample Size	2	1,845
	Wgt'd Count	89	117,809
	Std. Err.	88	8,942
Work-related business	Sample Size	6	4,895
	Wgt'd Count	270	318,052
	Std. Err.	149	11,437
Shopping	Sample Size	1	1,239
	Wgt'd Count	5	95,693
	Std. Err.	5	5,732
School	Sample Size		294
	Wgt'd Count		24,153
	Std. Err.		3,121
Religious activity	Sample Size	2	231
	Wgt'd Count	142	19,622
	Std. Err.	131	2,841
Medical/Dental	Sample Size	1	570
	Wgt'd Count	3	47,783
	Std. Err.	3	4,785
Other	Sample Size	5	3,018
Family/Personal	Wgt'd Count	418	203,044
Business	Std. Err.	256	9,029
Pick up/Drop off someone	Sample Size	2	1,058
	Wgt'd Count	80	75,207

(CONTINUED)

Standard Table 11: Number of Travel Period Trips in Thousands, by Travel Mode and Purpose

		Transportation Mode	
		Not Determined	All
Trip Purpose			
Pick up/Drop off someone	Std. Err.	80	4,823
Vacation	Sample Size	1	1,915
	Wgt'd Count	116	126,654
	Std. Err.	116	6,774
Visit Friends and Relatives	Sample Size	7	7,713
	Wgt'd Count	461	516,799
	Std. Err.	301	13,573
Go out to eat	Sample Size		84
	Wgt'd Count		5,310
	Std. Err.		982
Other Social/Recreational	Sample Size	3	6,275
	Wgt'd Count	18	417,441
	Std. Err.	13	11,562
Other	Sample Size	1	494
	Wgt'd Count	91	27,676
	Std. Err.	91	2,569
Not Determined	Sample Size	9	16
	Wgt'd Count	463	934
	Std. Err.	238	331
All	Sample Size	40	29,647
	Wgt'd Count	2,157	1,996,178
	Std. Err.	555	29,797

Standard Table 12: Average Vehicle Occupancy, by Trip Purpose and Trip Length(POV trips)

		Trip Length (Miles)					
		<=5	6-10	11-15	16-20	21-30	31+
Trip Purpose							
Go to work	Sample Size	11953.00	6435.00	3961.00	2396.00	2424.00	2180.00
	Wgt'd Ratio	1.09	1.08	1.06	1.09	1.11	1.17
	Std. Err.	0.01	0.01	0.01	0.02	0.02	0.02
Work-related business	Sample Size	4387.00	1559.00	923.00	600.00	598.00	1009.00
	Wgt'd Ratio	1.17	1.19	1.15	1.18	1.15	1.27
	Std. Err.	0.02	0.03	0.02	0.04	0.04	0.04
Return to work	Sample Size	3913.00	765.00	243.00	97.00	106.00	148.00
	Wgt'd Ratio	1.25	1.15	1.22	1.42	1.12	1.31
	Std. Err.	0.02	0.02	0.08	0.18	0.05	0.10
Shopping	Sample Size	27502.00	5160.00	1814.00	851.00	746.00	624.00
	Wgt'd Ratio	1.48	1.61	1.68	1.74	1.80	2.04
	Std. Err.	0.01	0.02	0.04	0.06	0.07	0.08
School	Sample Size	1244.00	441.00	233.00	177.00	126.00	123.00
	Wgt'd Ratio	1.40	1.25	1.18	1.09	1.11	1.27
	Std. Err.	0.04	0.04	0.05	0.03	0.04	0.12
Religious activity	Sample Size	2037.00	535.00	175.00	78.00	56.00	53.00
	Wgt'd Ratio	1.84	2.00	2.36	2.17	2.11	2.51
	Std. Err.	0.05	0.09	0.17	0.25	0.19	0.31
Medical/Dental	Sample Size	1295.00	551.00	240.00	138.00	122.00	124.00
	Wgt'd Ratio	1.39	1.37	1.45	1.41	1.45	1.61
	Std. Err.	0.03	0.04	0.08	0.08	0.09	0.10
Other	Sample Size	18010.00	3878.00	1550.00	725.00	631.00	674.00
Family/Personal Business	Wgt'd Ratio	1.37	1.45	1.46	1.48	1.58	1.79
	Std. Err.	0.01	0.02	0.03	0.06	0.06	0.07

(CONTINUED)

Standard Table 12: Average Vehicle Occupancy, by Trip Purpose and Trip Length(POV trips)

		Trip Length (Miles)					
		<=5	6-10	11-15	16-20	21-30	31+
Trip Purpose							
Other							
Family/Personal							
Business							
Pick up/Drop off	Sample Size	13786.00	3770.00	1559.00	694.00	657.00	568.00
someone	Wgt'd Ratio	2.02	1.96	1.88	1.85	1.94	2.20
	Std. Err.	0.02	0.03	0.04	0.05	0.06	0.07
Vacation	Sample Size	58.00	23.00	19.00	7.00	10.00	116.00
	Wgt'd Ratio	2.30	2.46	2.90	2.15	1.81	2.53
	Std. Err.	0.29	0.27	0.57	0.94	0.38	0.16
Visit Friends and	Sample Size	5368.00	1882.00	915.00	489.00	499.00	746.00
Relatives	Wgt'd Ratio	1.53	1.57	1.59	1.66	1.60	1.94
	Std. Err.	0.02	0.04	0.05	0.07	0.06	0.07
Go out to eat	Sample Size	6882.00	1506.00	570.00	256.00	217.00	225.00
	Wgt'd Ratio	1.83	1.99	2.19	2.08	2.12	2.42
	Std. Err.	0.02	0.05	0.10	0.10	0.14	0.16
Other	Sample Size	5493.00	2033.00	922.00	498.00	459.00	627.00
Social/Recreation-	Wgt'd Ratio	1.80	1.89	1.90	1.97	2.02	2.53
al	Std. Err.	0.03	0.04	0.06	0.09	0.08	0.08
Other	Sample Size	98.00	34.00	18.00	10.00	13.00	24.00
	Wgt'd Ratio	1.96	2.34	2.55	1.15	1.69	1.70
	Std. Err.	0.23	0.22	0.60	0.12	0.28	0.24
To go home	Sample Size	48932.00	15545.00	7388.00	4018.00	3811.00	3979.00
	Wgt'd Ratio	1.45	1.47	1.45	1.43	1.40	1.60
	Std. Err.	0.01	0.01	0.02	0.02	0.02	0.03

(CONTINUED)

Standard Table 12: Average Vehicle Occupancy, by Trip Purpose and Trip Length(POV trips)

		Trip Length (Miles)					
		<=5	6-10	11-15	16-20	21-30	31+
Trip Purpose							
Not Determined	Sample Size	15.00	2.00		2.00	3.00	3.00
	Wgt'd Ratio	1.22	1.00		1.00	3.41	1.82
	Std. Err.	0.21	0.00		0.00	1.34	0.21
All	Sample Size	150973.00	44119.00	20530.00	11036.00	10478.00	11223.00
	Wgt'd Ratio	1.49	1.50	1.47	1.45	1.44	1.66
	Std. Err.	0.01	0.01	0.01	0.02	0.02	0.02

(CONTINUED)

Standard Table 12: Average Vehicle Occupancy, by Trip Purpose and Trip Length(POV trips)

		Trip Length (Miles)	
		Not Determined	All
Trip Purpose			
Go to work	Sample Size	190.00	29539.00
	Wgt'd Ratio	1.20	1.09
	Std. Err.	0.06	0.00
Work-related business	Sample Size	73.00	9149.00
	Wgt'd Ratio	1.23	1.18
	Std. Err.	0.13	0.01
Return to work	Sample Size	30.00	5302.00
	Wgt'd Ratio	1.09	1.24
	Std. Err.	0.05	0.01
Shopping	Sample Size	262.00	36959.00
	Wgt'd Ratio	1.85	1.53
	Std. Err.	0.13	0.01
School	Sample Size	28.00	2372.00
	Wgt'd Ratio	1.07	1.30
	Std. Err.	0.06	0.02
Religious activity	Sample Size	21.00	2955.00
	Wgt'd Ratio	2.45	1.95
	Std. Err.	0.34	0.04
Medical/Dental	Sample Size	20.00	2490.00
	Wgt'd Ratio	2.21	1.41
	Std. Err.	0.64	0.02

(CONTINUED)

Standard Table 12: Average Vehicle Occupancy, by Trip Purpose and Trip Length(POV trips)

		Trip Length (Miles)	
		Not Determined	All
Trip Purpose			
Other	Sample Size	140.00	25608.00
Family/Personal	Wgt'd Ratio	1.71	1.41
Business	Std. Err.	0.14	0.01
Pick up/Drop off someone	Sample Size	227.00	21261.00
	Wgt'd Ratio	2.02	1.99
	Std. Err.	0.12	0.01
Vacation	Sample Size	5.00	238.00
	Wgt'd Ratio	3.52	2.50
	Std. Err.	0.56	0.15
Visit Friends and Relatives	Sample Size	103.00	10002.00
	Wgt'd Ratio	1.83	1.59
	Std. Err.	0.21	0.02
Go out to eat	Sample Size	61.00	9717.00
	Wgt'd Ratio	2.06	1.90
	Std. Err.	0.26	0.02
Other Social/Recreational	Sample Size	66.00	10098.00
	Wgt'd Ratio	1.81	1.89
	Std. Err.	0.22	0.02
Other	Sample Size	4.00	201.00
	Wgt'd Ratio	1.45	1.98
	Std. Err.	0.29	0.15
To go home	Sample Size	527.00	84200.00
	Wgt'd Ratio	1.62	1.46

(CONTINUED)

Standard Table 12: Average Vehicle Occupancy, by Trip Purpose and Trip Length(POV trips)

		Trip Length (Miles)	
		Not Determined	All
Trip Purpose			
To go home	Std. Err.	0.08	0.01
Not Determined	Sample Size		25.00
	Wgt'd Ratio		1.78
	Std. Err.		0.51
All	Sample Size	1757.00	250116.00
	Wgt'd Ratio	1.69	1.50
	Std. Err.	0.06	0.01

Appendix B. SAS Standard Error Macro (table.sas)

```
%macro table(outdata,indatay,ywt,yvar,  
rowvar,colvar,pagevar,  
indatax,xwt,xvar,RCPx,rowfmt,colfmt,pagefmt,nhouse);
```

```
/*
```

```
SAS macro for computing summary statistics and standard  
errors from NPTS.
```

```
NOTE: THIS DRAFT MACRO IS NOT READY FOR PUBLIC RELEASE.
```

```
NOTE: This program is distributed in the hope that it will  
be useful, but WITHOUT ANY WARRANTY, without even an  
implied warranty of MERCHANTABILITY or FITNESS FOR A  
PARTICULAR PURPOSE.
```

```
AUTHOR: Rick Schmoyer (ric@ornl.gov)
```

```
ACKNOWLEDGEMENT: Thanks to Jenny Young for finding bugs.
```

```
ARGUMENTS:
```

```
outdata=output data set. Necessary.
```

```
indatay=input data set containing y variable (yvar). Necessary.  
MUST BE SORTED BY VARSTRAT SUBSTRAT HOUSEID;  
Unchanged on output.
```

```
ywt=weight for numerator variable in ratio (if xwt defined). Necessary.  
yvar=analysis variable for numerator in ratio. Optional.
```

```
rowvar=first class variable (defines rows). Optional,  
but necessary if colvar is defined.
```

```
colvar=second class variable (defines columns). Optional,  
but necessary if pagevar is defined.
```

```
pagevar=third class variable (defines pages). Optional.
```

```
indatax=input data set containing x variable (xvar). Optional,  
but MUST BE SORTED BY VARSTRAT SUBSTRAT HOUSEID. Can be the same  
as indatay. Unchanged on output.
```

```
xwt=weight for denominator in ratio. Optional.
```

```
xvar=analysis variable for denominator in ratio. Optional.
```

```
RCPx=subset of rowvar colvar pagevar to define denominator classes.  
RCPx must be formable by deletion of zero or more entries  
in the rowvar colvar pagevar list. Optional.
```

```
rowfmt=name of user-supplied format for row variable (to override default)
```

```
colfmt=name of user-supplied format for column variable (to override default)
```

```
pagefmt=name of user-supplied format for page variable (to override default)
```

```
nhouse=SAS data set with variables varstrat (stratum)  
substrat (substratum) and nhouse (number of households).  
nhouse must be computed from a proper count of households  
not excluded by a subsetting where or because of missing  
data (e.g., trips for that household, but trip variables of  
interest all missing). Household counts should not exclude  
variables simply because they are not represented in indatay  
(e.g., no trips for a household does not automatically imply  
the household should not be counted).
```

```
NOTE: Class variable code '.' is not admitted (i.e., is  
dropped in proc means). Use something like 999 instead.
```

(Further, proc means does generate '.' values for the All categories.)

NOTE: Formats entered implicitly along with data must be in library 'LIBRARY'. Formats entered explicitly as macro arguments must be in default work library.

NOTE: Must have mautosource options and SASAUTOS= defined right to call SAS system macros (see sasautos).

OUTPUT VARIABLES in outdata ('&' denotes macro argument):

NOTE: THESE VARIABLE NAMES ARE RESERVED WORDS.

&rowvar Same as input
&colvar Same as input
&pagevar Same as input

&yvar If &yvar is not blank then weighted sum of input &yvar.
If &yvar is blank, then macro variable yvar is reassigned value &ywt, and &yvar becomes sum of &yvar (&ywt).

&ywt Sum of input &ywt

xvar If &xvar is blank then macro variable xvar is reassigned value &xwt. Then &xvar is renamed to xvar. This avoids problem when &xvar=&yvar or &xwt=&ywt.

ny Number of observations with a &yvar, or, if no &yvar, then &ywt
nx Number of observations with an xvar

std_erry Standard error of &yvar total
se_ywt Standard error of &ywt total
std_errx Standard error of xvar total

ratiox Ratio of &yvar to xvar totals
ratioy Ratio of &yvar to &ywt totals

se_ratx Standard error of ratiox--based on Taylor approximation
se_raty Standard error of ratioy--based on Taylor approximation

se_ratx1 | Standard errors of ratios when ratio denominator
se_raty1 | is FIXED, as when denominator is a control total

corr_x Weighted correlation of xvar and &yvar
corr_y Weighted correlation of &yvar and &ywt

lcb_fx | Lower and Upper Fieller-type 95% two-sided confidence
uch_fx | bounds for ratio estimates (see Fieller E. (1932), "The
lcb_fy | distribution of the index in normal bivariate populations,"
uch_fy | BIOMETRIKA, 24, 428-440) based on se_ratx and se_raty.

lcb_tx |
uch_tx | Lower and Upper 95% two-sided confidence bounds for
lcb_ty | ratio estimates, based on Taylor approximation for
uch_ty | variance of ratio. Based on se_ratx and se_raty.

NOTE: Ratio LCBs are allowed to be negative to accommodate cases when numerators are negative. If they turn out negative when they are logically nonnegative, set them to zero. But if ratio estimate DENOMINATORS turn out nonpositive, ratio estimates and variances are not computed. Further, Fieller confidence bounds are not computed if (1) denominators are not SIGNIFICANTLY different from zero, which occurs when when $A < 0$ in quadratic equation $Az^2 + Bz + C = 0$ for confidence bounds (i.e., roots are confidence bounds--see below), or (2) when modulus $B^2 - 4AC$ is

negative (no real roots).

NOTE: Confidence bounds are based on normal approximation.
*/

```
%local dsn dsnx crossx crossy covx covy std_errx  
dsid rfmt rowtype cfmt coltype pfmt pagetype rc  
rowlib collib pagelib ycode rowf colf pagf yvarlab  
ywtlab xlabel;
```

```
%if &rowfmt ne %then %let rowlib=work;  
%else %let rowlib=library;
```

```
%if &colfmt ne %then %let collib=work;  
%else %let collib=library;
```

```
%if &pagefmt ne %then %let pagelib=work;  
%else %let pagelib=library;
```

```
*STEP 1: Weight analysis variables and assign formats;  
data;  
set &indatay (keep=varstrat substrat houseid  
&yvar &ywt &rowvar &colvar &pagevar);
```

```
%if &yvar= %then %do;  
  %let yvar=&ywt;  
  %let ycode=NR; *No ratio;  
  if _n_=1 then do;  
    length yvarlab $ 40;  
    call label(&ywt,yvarlab);  
    call symput('yvarlab',trim(left(yvarlab)));  
    drop yvarlab;  
  end;
```

```
%end;  
%else %do;  
  &yvar=&yvar*&ywt;  
  %let ycode=R; *Ratio;  
  %let crossy=crossy;  
  %let covy=covy;  
  if _n_=1 then do;  
    length yvarlab ywtlab $ 40;  
    call label(&ywt,ywtlab);  
    call label(&yvar,yvarlab);  
    call symput('ywtlab',trim(left(ywtlab)));  
    call symput('yvarlab',trim(left(yvarlab)));  
    drop ywtlab yvarlab;  
  end;
```

```
%end;  
  
%if &rowfmt ne %then %str(format &rowvar &rowfmt.);  
%if &colfmt ne %then %str(format &colvar &colfmt.);  
%if &pagefmt ne %then %str(format &pagevar &pagefmt.);  
run;  
%let dsn=%trim(%left(&syslast));
```

```
%if &xwt ne %then %do;  
  data;  
  set &indatay (keep=varstrat substrat houseid &xvar &xwt &RCPx);  
  %if &xvar= %then %let xvar=&xwt;  
  %else %str(&xvar=&xvar*&xwt);  
  rename &xvar=xvar;  
  run;  
  %let dsnx=%trim(%left(&syslast));
```

```
*Associate user assigned formats for X data;  
%let dsid=%sysfunc(open(&dsnx,i));  
%if (&rowvar ne ) and (&rowfmt ne ) %then %if  
  %sysfunc(varnum(&dsid,&rowvar)) %then %let rowf=1;
```

```

    %if (&colvar ne ) and (&colfmt ne ) %then %if
        %sysfunc(varnum(&dsid,&colvar)) %then %let colf=1;
    %if (&pagevar ne ) and (&pagefmt ne ) %then %if
        %sysfunc(varnum(&dsid,&pagevar)) %then %let pagf=1;
    %let xlabel=%sysfunc(varlabel(&dsid, %sysfunc(varnum(&dsid,xvar))));
    %if %quote(&xlabel) eq %then %let xlabel=&xvar;
    %let rc=%sysfunc(close(&dsid));

    proc datasets;
    modify %scan(&dsnx,2,.);
    %if &rowf ne %then %str(format &rowvar &rowfmt.);
    %if &colf ne %then %str(format &colvar &colfmt.);
    %if &pagf ne %then %str(format &pagevar &pagefmt.);
    %end;

%else %do;
    data;
    run;
    %let dsnx=%trim(%left(&syslast));
%end;

*STEP 2: For each class C, sum up weights to household
(ultimate cluster) level. Note that C may be an
intersection or union. Classes are defined by rowvar colvar pagevar;

proc means data=&dsn noprint;
%if &rowvar ne %then %str(class &rowvar &colvar &pagevar);
by varstrat substrat houseid;
%if &rcode=NR %then %str(var &yvar);
%else %str(var &yvar &ywt);
output out=&dsn (drop=_FREQ_ _TYPE_)
n=ny
sum=;
run;

%if &xwt ne %then %do;

    %let crossx=crossx;
    %let covx=covx;

    proc means noprint data=&dsnx;
    %if &RCPx ne %then %str(class &RCPx);
    by varstrat substrat houseid;
    var xvar;
    output out=&dsnx (drop=_TYPE_ _FREQ_)
n=nx
sum=;
run;

    *Idea now is to merge each possibly broader x-total with
its corresponding y-total;

    proc sort data=&dsnx;
    by varstrat substrat &RCPx houseid;

    proc sort data=&dsn;
    by varstrat substrat &RCPx houseid;

    data &dsn;
    merge &dsn (in=in1) &dsnx (keep=varstrat substrat houseid &RCPx xvar);
    by varstrat substrat &RCPx houseid;
    if in1;
    crossx=xvar*&yvar;
    drop xvar;

*STEP 3: Summary stats--sums over households--by substratum
within stratum for each class C. Class statement is not
used because _TYPE_ has already been defined.;

```

```

proc means noprint data=&dsnx;
by varstrat substrat &RCPx;
var xvar nx;
output out=&dsnx (drop=_freq_ _type_)
sum=
uss(xvar)=ussx;

*Merge in ultimate cluster frequency in each substratum;
data &dsnx;
merge &dsnx (in=in1) &nhouse;
by varstrat substrat;

if in1;
  if nhouse gt 1 then
    std_errx=(nhouse/(nhouse-1))*(ussx - xvar*xvar/nhouse);

    *If substratum has only one observation then estimate
    variance as square of total (expectation is variance + mean
    squared). This is OK as long as there are not many
    singletons, but may be extremely conservative if there are.;

    else std_errx=xvar*xvar;
%end;

%if &ycode=R %then %do;
  data &dsn;
  set &dsn;
  crossy=&yvar*&ywt;
%end;

proc sort data=&dsn;
by varstrat substrat &rowvar &colvar &pagevar;

proc means noprint data=&dsn;
by varstrat substrat &rowvar &colvar &pagevar;
%if &ycode=R %then %str(var &yvar &ywt &crossy &crossx ny);
%else %str(var &yvar &crossx ny);
output out=&dsn (drop=_freq_ _type_)
sum=
%if &ycode=R %then %str(uss (&yvar &ywt)=uss ussw);
%else %str(uss (&yvar)=uss);

*Merge in x-data plus ultimate cluster frequency in each
substratum (nhouse);

%if &xwt ne %then %do;
  proc sort data=&dsn;
  by varstrat substrat &RCPx;

  data &dsn;
  merge &dsn (in=in1) &dsnx (keep=nhouse xvar varstrat substrat &RCPx);
  by varstrat substrat &RCPx;

  if in1;

    if nhouse gt 1 then do;
      std_erry=(nhouse/(nhouse-1))*(uss - &yvar*&yvar/nhouse);
      covx=(nhouse/(nhouse-1))*(&crossx - xvar*&yvar/nhouse);
      %if &ycode=R %then %do;
        covy=(nhouse/(nhouse-1))*(&crossy - &yvar*&ywt/nhouse);
        se_ywt=(nhouse/(nhouse-1))*(ussw - &ywt*&ywt/nhouse);
      %end;
    %end;

    end;

    *If substratum has only one observation then estimate
    variance as square of total (expectation is variance + mean
    squared). This is OK as long as there are not many

```

```

singletons, but may be extremely conservative if there are.;

    else do;
        covx=xvar*&yvar;
        std_erry=&yvar*&yvar;
        %if &ycode=R %then %do;
            covy=&ywt*&yvar;
            se_ywt=&ywt*&ywt;
        %end;
    end;

drop nhouse xvar;

%end;

%else %do;
    data &dsn;
    merge &dsn (in=in1) &nhouse;
    by varstrat substrat;

    if in1;

        if nhouse gt 1 then do;
            std_erry=(nhouse/(nhouse-1))*(uss - &yvar*&yvar/nhouse);
            %if &ycode=R %then %do;
                covy=(nhouse/(nhouse-1))*(&crossy - &yvar*&ywt/nhouse);
                se_ywt=(nhouse/(nhouse-1))*(ussw - &ywt*&ywt/nhouse);
            %end;
        end;

        else do;
            std_erry=&yvar*&yvar;
            %if &ycode=R %then %do;
                se_ywt=&ywt*&ywt;
                covy=&ywt*&yvar;
            %end;
        end;
    drop nhouse;
%end;

*STEP 4: Tally up over substrata within classes;

proc means noprint data=&dsn nway missing;
class &rowvar &colvar &pagevar;
%if &ycode=R %then %str(var ny &yvar &ywt std_erry se_ywt &covx &covy);
%else %str(var ny &yvar std_erry &covx);
output out=&dsn (drop=_freq_ _type_)
sum=;

%if &xwt ne %then %do;
    %if &RCPx ne %then %do;
        proc means noprint data=&dsnx nway missing;
        class &RCPx;
        var nx xvar std_errx;
        output out=&dsnx (drop=_freq_ _type_)
        sum=;

        proc sort data=&dsn;
        by &RCPx;

        data &outdata;
        merge &dsn &dsnx;
        by &RCPx;
    %end;

%else %do;
    proc means noprint data=&dsnx;
    var nx xvar std_errx;

```

```

output out=&dsnx (drop=_freq_ _type_)
sum=;

data &outdata;
retain xvar std_errx;
set &dsn;
if _n_ eq 1 then set &dsnx (keep=nx xvar std_errx);
%end;

if xvar gt 0 then do;
ratiox=&yvar/xvar;
se_ratx=(std_erry + std_errx*ratiox**2 - 2*covx*ratiox)/(xvar**2);
se_ratxl=std_erry/xvar**2;

*SE_RAT1 is std. err. of ratio when denominator is FIXED--as when
its a control total. How to identify this case?

*Fieller-type 95% two-sided confidence bounds;
t=probit(.975);
A=xvar**2-t**2*std_errx;
B=2*(t**2*covx-&yvar*xvar);
C=&yvar**2-t**2*std_erry;

MOD=B*B-4*A*C;

*IF A lt 0, then xvar (denominator in ratio) is not
significantly different from 0--ratio does not make much
sense;
if A gt 0 then do;
if MOD ge 0 then do;
MOD=sqrt(MOD);
ucb_fx=(-B+MOD)/(2*A);
lcb_fx=(-B-MOD)/(2*A);
end;
end;
else if A eq 0 then do;
if B gt 0 then ucb_fx=-C/B;
else if B lt 0 then lcb_fx=-C/B;
end;
if se_ratx ne . then se_ratx=sqrt(max(se_ratx,0));
if se_ratxl ne . then se_ratxl=sqrt(max(se_ratxl,0));
*Taylor-type 95% two-sided confidence bounds;
lcb_tx=ratiox-t*se_ratx;
ucb_tx=ratiox+t*se_ratx;
drop t A B C MOD;
end;

if std_errx gt 0 and std_erry gt 0 then
corr=covx/(sqrt(std_errx)*sqrt(std_erry));
drop covx;

std_errx=sqrt(std_errx);
label
nx="Num. with &xlabel"
std_errx="SE &xlabel"
ratiox="Ratio &yvarlab to &xlabel"
se_ratx="Taylor SE Ratio"
se_ratxl='Fixed-denom. Ratio SE'
corr="Corr &xlabel and &yvarlab"
lcb_fx='Fieller LCB X-Ratio'
ucb_fx='Fieller UCB X-Ratio'
lcb_tx='Taylor LCB X-Ratio'
ucb_tx='Taylor UCB X-Ratio';
%end;
%else %do;
data &outdata;
set &dsn;
%end;

```

```

%if &ycode=R %then %do;

  if &ywt gt 0 then do;
    ratioy=&yvar/&ywt;
    se_raty=(std_erry + se_ywt*ratioy**2 - 2*covy*ratioy)/(&ywt**2);
    se_ratyl=std_erry/&ywt**2;

    *SE_RATY1 is std. err. of ratio when denominator is FIXED--as when
    its a control total. How to identify this case?

    *Fieller-type 95% two-sided confidence bounds;
    t=probit(.975);
    A=&ywt**2-t**2*se_ywt;
    B=2*(t**2*covy-&yvar*&ywt);
    C=&yvar**2-t**2*std_erry;

    MOD=B*B-4*A*C;

    *IF A lt 0, then ywt (denominator in ratio) is not
    significantly different from 0--ratio does not make much
    sense;
    if A gt 0 then do;
      if MOD ge 0 then do;
        MOD=sqrt(MOD);
        ucb_fy=(-B+MOD)/(2*A);
        lcb_fy=(-B-MOD)/(2*A);
      end;
    end;
    else if A eq 0 then do;
      if B gt 0 then ucb_fy=-C/B;
      else if B lt 0 then lcb_fy=-C/B;
    end;
    if se_raty ne . then se_raty=sqrt(max(0,se_raty));
    if se_ratyl ne . then se_ratyl=sqrt(max(0,se_ratyl));
    *Taylor-type 95% two-sided confidence bounds;
    lcb_ty=ratioy-t*se_raty;
    ucb_ty=ratioy+t*se_raty;
    drop t A B C MOD;
  end;

  se_ywt=sqrt(se_ywt);
  if se_ywt gt 0 and std_erry gt 0 then
    corry=covy/(se_ywt*sqrt(std_erry));
  drop covy;

  label
  se_ywt="SE &ywtlab"
  ratioy="Ratio &yvarlab to &ywtlab"
  se_raty="Taylor SE Ratio"
  se_ratyl='Fixed-denom. Ratio SE'
  corry="Corr &yvar and &ywtlab"
  lcb_fy='Fieller LCB Ratio'
  ucb_fy='Fieller UCB Ratio'
  lcb_ty='Taylor LCB Ratio'
  ucb_ty='Taylor UCB Ratio';
%end;

std_erry=sqrt(std_erry);
label ny="Num. with &yvarlab"
  std_erry="SE &yvarlab";

*Return to rowvar colvar pagevar order;
%if &rowvar ne %then %do;
  proc sort data=&outdata;
    by &rowvar &colvar &pagevar;
%end;

```

```
*Cleanup;  
proc datasets; delete %scan(&dsn,2,.) %scan(&dsnx,2,.);  
run;  
%mend table;
```

Appendix C. Standard Error Computation with Subsets of the NPTS Data

Standard errors for NPTS estimates depend on the numbers of households represented in the estimates. It is therefore necessary that subsetting statements like “where state eq 'AL'” or “where sex eq 'F'” are properly accounted for in the standard error calculations. A subsetting restriction like “where state eq 'AL'”, for example, reduces the number of households considered, but “where sex eq 'F'” typically would not exclude households (unless perhaps the intent was to exclude households with only males). Ordinarily “where sex eq 'F'” would simply indicate that results for males should not be counted in the tabulations, and not that any households should be excluded from the sample.

This appendix describes the approach taken in the web server macro `tablew.sas` to inferring from subsetting where statements, the correct number of households for the analysis. If a where statement component involves only household level variables (e.g., “where state eq 'AL'”), call it a household (HH) level component. If a where statement component involves only lower level data variables (e.g., “where sex eq 'F'”), call it a lower level (LL) component. Call a where statement component mixed if it combines both HH and LL components, as in “where state eq 'AL' and ‘sex eq 'F'”. Inferring the correct interpretation can become especially complicated when the subsetting restrictions are mixed.

If we assume that LL components should not exclude households, then one approach to handling mixed where statements would be to set LL components to TRUE, so that, effectively, only HH components remain, and the modified where statement would consist entirely of HH components. The households excluded by the modified where statement would then not be counted when computing standard errors. However, a hitch in implementing this approach is the “NOT” operator. Because any where statement component can be modified by a NOT operator, for the approach of setting LL components to TRUE to work, NOTs must first be distributed over compound expressions.¹

Furthermore, because it is generally not feasible to check that various where statement components are sensible, the approach of setting LL components to TRUE cannot guarantee the correct interpretation of the where statement. Thus the intent of “where sex eq 'F'” could possibly be to exclude households with only males. Though not exactly sensible, a where statement such as “where state eq 'AL' or (state ne 'AL' and sex eq 'Z')” could (assuming it's not a typo) be interpreted as an implicit attempt to exclude Alabama households. If “sex eq 'Z'” is simply set to TRUE, the result is “where state eq 'AL' or state ne 'AL'”, which would not exclude anything. But the user's

¹For example, suppose the intent is to compute totals for females from Alabama. This could be expressed as “where state eq 'AL' and sex eq 'F'”. In that case, the approach of setting the sex eq 'F' component to TRUE would work: The expression reduces to “where state eq 'AL'”, and so only households from Alabama would be included in the analysis. However, the same where statement can also be written as “where NOT (state ne 'AL' or sex ne 'F')”. With this where statement, the “sex ne 'F'” component should not be set to TRUE, because “where NOT (state ne 'AL' or TRUE)” is (by De Morgan's law) the same as “where state eq 'AL' and FALSE,” which is always false, and thus all households would be excluded. Instead, the NOT should be distributed over the compound expression in parenthesis to give “where (NOT state ne 'AL') and (NOT (sex ne 'F'))”. Then, setting the “NOT (sex ne 'F')” component to TRUE gives “where NOT (state ne 'AL')”, or simply “where state eq 'AL'.” Because of the unlimited potential complexity of where statements, this distribution of NOTs should be recursive.

intentions here cannot be inferred with certainty.

Because of problems like these, the `tablew.sas` macro (and web interface) handles user-supplied where statements as follows. If the statement is `HH` (not mixed), it is assumed to exclude households from the sample. If it is `LL`, it is assumed to exclude observations from the tabulations, but not from the sample. If the where statement is mixed, then the macro requires that the user explicitly distinguish which households should be used in the analysis by supplying a `HH` statement to define the subset of observations to be used. `LL` components are assumed not to exclude households from the sample.

A user who is uncomfortable with this approach to handling where statements can download the NPTS data sets and the SAS macro, subset the data before inputting it to the SAS macro, and run the macro without a where statement. This will guarantee that exactly those households the user intends to include, will actually be included.