PAPER

Using the NPTS and the ATS Together A Case Study

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BACKGROUND AND OBJECTIVES

In 1995, the U.S. Department of Transportation conducted two national travel surveys: the Nationwide Personal Transportation Survey (NPTS) and the American Travel Survey (ATS). The NPTS focused on daily travel. The ATS focused on long-distance travel. The NPTS also collected data on trips 75 mi or more one-way. The ATS collected data on trips 75 mi or more one-way as well, but only trips 100 mi or more one-way were included in the final public use file. The reason for not reporting trips between 75 and 100 mi one-way was that respondents' perceptions of trip lengths between 75 and 100 mi long are rather inexact.

Although both surveys targeted similar populations, there are several differences in their survey methodologies. For example, the time frame for NPTS respondents to report long trips was a 2-week window—all long trips made by any household member ending during a pre-assigned 2-week period were reported. On the other hand, the ATS required its respondents to report all long trips that ended during the 12-month period from January 1995 to December 1995.

With the enormous wealth of information in both surveys, it is tempting to combine data from both sources in an effort, for example, to estimate overall personal travel at the national level. Before answering the question of "How to combine?" the question of "Can they be combined?" should be addressed first.

This paper reports on an examination of the issue of whether NPTS and ATS data can be combined. The question was addressed by first examining the comparability of the data sources. Comparability between the two surveys is established from the viewpoint of whether the resulting summary travel statistics categorized by trip purpose and travel mode are significantly different from each other. Since round-trips going to places at least 100 mi away from home are a common element in both surveys, this analysis is limited to those trips. If the statistics for these long trips are not comparable, then the analysis identifies reasons contributing to the differences. A simulation was undertaken to determine how different data collection time periods, which the two surveys used, impact final survey results. Finally, we offer recommendations to increase the data comparability between the next NPTS and ATS in the year 2000.

SIMILARITIES AND DISSIMILARITIES IN METHODOLOGY BETWEEN NPTS AND ATS

To establish the groundwork for valid comparisons between these two surveys, it is important first to understand their similarities and dissimilarities. In this section, we examine whether the two surveys targeted the same population. We then identify dissimilarities in survey methodology and data definition that could potentially trigger differences in the final survey outcomes.

Target Population

The NPTS and the ATS both targeted the civilian, non-institutionalized population of the United States. Nonetheless, the two surveys differ on three major points. First, the NPTS used a listing of all valid residential telephone numbers to select its sample while the ATS used an address-based sampling frame. The implication of this difference in the sample frames is that households without a telephone were excluded from the NPTS. Second, the NPTS excluded individuals younger than 5 years old, while the ATS included all ages. Finally, while the NPTS excluded college students living in dormitories, the ATS did not. To minimize the impact of these differences on our analyses, we eliminated from our comparison ATS data on individuals younger than 5 years old and college students living in dormitories.

Except for the previously mentioned differences, the NPTS and the ATS basically drew their samples from the same population with respect to age, gender, education, and household size.

However, the ATS seemed to sample from a population with more low-income households than did the NPTS, partially reflecting the greater ability of ATS' address-based sampling frame to sample low income households. The differences between the two surveys become prominent again for households earning between \$40,000 and \$75,000 a year (Figure 1). Despite the fact that both the ATS and the Current Population Survey report income for calendar year 1994, the two sources are not exactly comparable. Among the three sources depicted in Figure 1, only the NPTS maintained unreported income as missing data.

Both the NPTS and the ATS suffered from a reluctance among households to report income information. While the ATS imputed missing or questionable data on household income, the NPTS did not. Seventeen percent of the NPTS households did not report income information. The percentage of ATS households that declined to report their income cannot be ascertained. However, about 45 percent of the ATS households have their income imputed or edited for one reason or another. Thus, different income definitions and imputation protocols in the surveys conceivably contributed to the difference in the income distribution between the surveys.

The NPTS asked for the total household income in the past 12 months, including wages and salaries, income from business or farm, Social Security, pensions, dividends, interest, rent, and any other income received. If the income was unreported, the data were not imputed or edited, but was categorized as either "not ascertained" or "refused." On the other hand, the ATS asked for both the total *family* income and the total *personal* income received from all of the aforementioned sources for 1994. The *household* income



FIGURE 1 Household distribution by 1994 household income.

is the total combined income of the head of the household and all persons related or unrelated to the head of the household who were living in the household as of the date of the first interview. If no income data were reported, the ATS imputed and edited the data.

The way the income question was worded also contributed somewhat to the difference between the two surveys. The NPTS households were asked to report their total household income in the 12-month period prior to their designated sample day. For example, if a household was assigned a travel day of January 15, 1996, then it was supposed to report its income during the period January 15, 1995 through January 14, 1996. Since the NPTS data collection began in May 1995 and ended in June 1996, income reported by the NPTS households presumably covered any 12-month period from May 1994 through June 1996. That said, many respondents probably did not follow these instructions on how to report their income. On the other hand, the ATS households were asked to report their income during the 1994 tax year. NPTS income was for any 12-month period between May 1994 and June 1996. ATS income was for 1994 tax year. Bureaus of Labor Statistics and Census data were for calendar year 1994—"Current Population Survey—Annual Demographic Survey March Supplement," Table H-1, Bureau of Labor Statistics and Bureau of the Census, November 1996.

Definitions

One of the most common and compelling reasons for discrepancies between data sources are differences in definitions. There is no exception in this case. Only major similarities and differences that have the potential to cause major discrepancies in final survey outcomes are outlined here. A more comprehensive list of definitional differences between these two surveys can be found in McGuckin (1998).

Trip A trip in the ATS is considered a round trip to a place at least 100 mi away from home. To ensure a more complete reporting of trips 100 mi or longer, ATS respondents were asked to report trips 75 mi or longer. However, only trips 100 mi or longer are reported in the ATS database.

Two different types of long trips were recorded in the NPTS: (1) those going to places 75 mi or more and returning home on the pre-assigned sample day, and (2) those going to places 75 mi or more and returning home during the 2-week period leading up to the pre-assigned sample day. Different definitions were used for these two types of long trips. While the latter includes round-trips similar in definition to the ATS trips, the former designates a trip to be one-way segments of travel with a stop made for a distinct purpose. For the purpose of comparison, all ATS trips and NPTS trips in the aforementioned second category that were 100 mi or longer (one-way) were used in our analysis.

Trip Distance ATS trip distances were calculated based on trip origin, trip destination, and mode used. A national network of highways, railroads, and air-routes was used to compute the "route" distances (Bronzini et al., 1996; Hwang et al., 1997). The shortest distance between two points (great circle distance) was provided for reference purposes. Based on information on route distances and great circle distances, the great circle distance is, on average, 22 percent less than the route distance, suggesting a circuity factor of 1.22. The NPTS reports great circle distances based on trip origins and trip destinations. While ATS distances were calculated from zip code centroid to zip code centroid to XSA centroid. It is speculated that a zip code-based calculation is more precise than an MSA-based calculation. However, the impact of this difference on the summary travel estimates [e.g., vehicle miles of travel or person-miles of travel (PMT)] is not readily available. To make trip distances from both surveys comparable, the guidelines we used were

- Great circle distances were used for all airplane trips,
- Route distances were used for all ATS non-airplane trips, and

• Circuity factor of 1.22 was applied to the great circle distances recorded for all NPTS non-airplane trips.

Trip Purpose In addition to summary travel statistics, comparability between the NPTS and the ATS was examined from the perspective of trip distribution by trip purpose and travel mode. With this comparison, it is essential to compare the trip purpose definitions of both surveys.

Although not completely synchronized, Table 1 illustrates the best attempt to align the definitions of the trip purposes between the two surveys.

Travel Mode Similar to trip purposes, the travel mode definitions from the two surveys were grouped into comparable categories (Table 2).

Survey Method

The NPTS was conducted from May 1995 through June 1996, while the ATS was from April 1995 to March 1996. Although NPTS data collection covered a 14-month period, its weighing factor was developed in such a way that the weighted statistics actually reflect activities for a 12-month period. In the NPTS, a travel day was assigned to each of the sampled households. Every trip made by every household member on the designated travel day was recorded. Also collected in the NPTS were round-trips 75 mi or longer

one-way, in which the traveler returned home during the 2-week period leading up to the designated travel day. Note that any trip 75 mi or longer was eligible for reporting, despite *when* the trip commenced, and as long as the traveler returned home from the trip during the 2-week period. It is trips in this category that were included in this analysis. A sampled household was contacted within 6 days of the designated travel day to collect trip information, or the household was dropped from the sample. In 1995, 42,033 households completed the NPTS survey.

		NPTS		ATS	
New Trip Purpose	Code	Trip Purpose	Code	Trip Purpose	
Work/	01	To Work;	01	Business;	
Business	02	Work-Related Business; Return to	02	Combined Business	
	03	Work		and Pleasure;	
			03	Convention,	
				Conference, or	
				Seminar	
Shopping	04	Shopping	10	Shopping	
School	05	School (Trips to school, college or	04	School-Related	
		university classes, or attending		Activity	
		school-related functions)			
Family/	06	Religious Activity; Medical/Dental;	11	Personal, Family, or	
Personal	07	Take Someone Somewhere;		Medical (wedding,	
Business	09	Pick Up Someone;		funeral, health	
	10	Other Family or Personal Business		treatment, etc.)	
	08	(Trips for the purchase of services			
		or to attend organized family			
		functions - e.g., car servicing,			
		wedding, etc.)			
Visit Friends	12	Visit Friends or Relatives	05	Visit Relatives or	
				Friends	
Leisure	11	Vacation;	06	Rest or Relaxation;	
	13	Went out to Eat (Does not include	07	Sightseeing or to Visit	
		trips to purchase food only);	0.0	a Historic or Scenic	
	1.4	Other Social/Recreational (e.g.,	08	Attraction; Outdoor	
	14	I rips to enjoy some sort of social		Recreation (sports,	
		activity such as party, sports event,	00	nunting, fisning,	
		movie, signiseeing, etc.)	09	boating, camping,	
				Entortainmont (attand	
				the theater or sports	
				event etc.)	
Other	16	Other	12	Other Reason	
Unreported	98	Not Ascertained:		NA	
	99	Refused			

TABLE 1 Alignment of Definitions of Trip Purposes Between the1995 NPTS and the 1995 ATS

	NPTS		ATS	
New Travel Mode	Code	Travel Mode	Code	Travel Mode
POV	01	Automobile;	01	Car, Pickup Truck, or
	02	Van;	02	Van; Other Truck;
	03	Sports Utility Vehicle; Pickup	03	Rental Car, Truck, or
	04	Truck;	15	Van ;
	05	Other Truck;	17	RV or Motor home;
	06	RV;		Motorcycle, Moped, or
	07	Motorcycle;		Motor bicycle
	08	Other POV (including mopeds		
		and other licensed vehicles that		
		are privately owner)		
Bus	09	Bus (Including mass transit	06	Bus (Intercity)
		systems and shuttle buses		
		available to the general public)		
Intercity Rail	10	Amtrak	09	Train (Intercity)
Other Public	11	Commuter Train;		NA
Transit	12	Streetcar/Trolley;		
	13	Subway/Elevated Rail		
Airplane	14	Airplane (available to public in exchange for a fare)	04	Commercial Airplane
Taxi	15	Taxi (include airport limo	10	Taxi
Bicycle	16	Bicycle	16	Bicycle
School Bus	18	School Bus (for school use	08	School Bus
20110012005	10	only)	00	
Other	19	Other (including chartered bus,	05	Corporate/Personal
		individual or company owned	07	Plane; Charter/Tour
		private airplane, and other non-	11	Bus;
		POV)	12	Ship or Boat;
			13	Cruise Ship;
			14	Passenger Line or
				Ferry; Recreational
			18	Boat, Sailboat, Pleasure
				Boat, or Yacht;
				Other Type
				Transportation
Unreported	98	Not Ascertained		NA
	99	Refused		

TABLE 2Alignment of Definitions of Travel Modes Between the1995 NPTS and the 1995 ATS

The ATS used a panel approach which was considerably different from the approach used by the NPTS. Sixty-five thousand households were "monitored" throughout the 12month period to collect information on long-distance trips in which the traveler returned home during the preceding 3-month period. These households were contacted once every quarter to collect this information. In essence, ATS respondents were asked to report longdistance trips in which the traveler returned home during a window of 12 months, compared to a 2-week window used by the NPTS. These different time frames (i.e., 2-week versus 12-month) could have a substantial impact on capturing long-distance trips.

The probability of being "counted" for taking a long-distance trip in which the traveler returns home during a 2-week period is relatively low for infrequent travelers and comparatively high for frequent travelers. Also, there are presumably more infrequent travelers than frequent travelers, in spite of how "frequent" travelers are defined. Thus, it is conceivable that the NPTS approach of collecting long-distance trips captured in a 2-week period is more likely than the ATS to capture trips taken by frequent travelers and to omit those taken by infrequent travelers. This hypothesis was tested using a simulation study and the results are reported in Section 4.

Sample Sizes

The two surveys have a different sample size. With 55 percent more households in its sample, the ATS naturally sampled more persons, and collected data on more trips. An appropriate weighting approach usually makes this issue irrelevant. That said, there is a surprisingly large discrepancy between the two surveys on the number of respondents who reported trips 100 mi or more one-way (Table 3). The implication of collecting long-distance travel data from a significantly smaller number of respondents, as in the NPTS, warrants more detailed investigation. One conceivable effect of collecting data on a greater number of trips is that estimates of long-distance travel based on ATS data are presumably more accurate than those based on NPTS data.

SUMMARY DEMOGRAPHICS AND TRAVEL STATISTICS

Whether the aforementioned methodological and sample size differences affect the comparability of the two surveys is addressed by first comparing their results. Hypothesis tests at $\alpha = 0.05$ are used to determine whether the differences between ATS and NPTS results are statistically different. Without a way of calculating ATS' standard errors, the corresponding standard errors based on the NPTS data were used as a proxy. This approach yields extremely conservative tests because ATS' large sample size would presumably result in standard errors significantly smaller than those of the NPTS. Using this alternative, any significant results would be even more significant if actual ATS standard errors were used. A shortcoming of using the proxy standard error is that insignificant results are actually inconclusive.

	NPTS	ATS
Households	42,033	54,120
Persons (5+)	95,360	128,154
Persons who took trips 100 mi or more	10,818	109,803
one-way during survey period		
No. of recorded person trips 100 mi or	13,053	531,715
more one-way		

TABLE 3 Sample Sizes of the NPTS and the ATS

Overall Demographics

Although the numbers of sampled households between the two surveys differ by more than 50 percent, both surveys were designed to capture travel patterns representative of an identical number of 98,990,000 households in the United States. This is one of the few similarities between the two surveys. Excluding children under 5 years old and college students living in dormitories, the ATS' population estimate is slightly higher than the NPTS' estimate (Table 4). Although this difference in population estimates is statistically significant, it probably has little practical bearing.

Characteristics of Travelers

Perhaps the most surprising difference between the two surveys is the estimated number of people who reportedly took a long distance trip during a 1-year period. While the NPTS estimated that 12 percent of all Americans took at least one long distance trip a

	NPTS	ATS
D	emographics	
Households	98,990,000	98,990,000
Persons (5+)	241,675,000 (1.281,000)	245,946,000 ^{1, **}
Persons took trips 100 mi one-way during survey period	28,817,849	212,476,736
Persor	n Travel Statistics	
Person Trips (PT)	912,750,040 (<i>17.329,466</i>)	996,483,563 **
PT/Person	3.78 (0.08)	4.05 **
РМТ	739,816,316,541 (38,017,103,333)	1,009,953,192,465 **
PMT/Person	3,061 (<i>160.09</i>)	4,106 **
Vehicl	e Travel Statistics	
Vehicle Trips (VT)	501,069,795 (10,852,495)	508,855,323
VT/Household	5.06 (0.12)	5.14
Vehicle Miles Traveled (VMT)	310,441,265,099 (18,901,252,997)	287,070,564,118
VMT/Household	3,136 (<i>192.98</i>)	2,900

TABLE 4	Estimated Summary Demographic and Travel Statistics 1995 NPTS
	Versus 1995 ATS

* Significantly different at $\alpha = 0.05$

¹ Without college students

Numbers in the parentheses are the corresponding NPTS standard errors.

year, the corresponding figure in the ATS was 86 percent. Once again, we speculate that the different lengths of the collection periods (2-week vs. 12-month) affect the likelihood of capturing trips taken by infrequent travelers. This hypothesis was tested using a simulation study (Section 4). The possibility that this is the case is partially supported by the fact that those in the NPTS who reported long-distance trips in 1995 tended to be of high income, male, and workers—some of the common traits of frequent travelers.

Vehicle Travel

Though reported in Table 4, statistics on *vehicle travel* between the two surveys should not be compared because of the appreciable differences in identifying vehicle trips. The NPTS defines a vehicle trip as one made in a privately owned vehicle (POV) in which the primary driver of the trip is a member of a sample household. Historically, the NPTS explicitly flagged the primary driver of a long-distance trip. However, this practice did not continue in 1995. Rather, an indication of the primary driver was imputed. On the other hand, the ATS did not identify the primary driver of a trip. The only plausible way of identifying vehicle trips in the ATS is to assume that all household trips made in a POV are vehicle trips and a household trip in the ATS refers to one in which one or more members of a household traveled together. Due to these differences between the surveys in defining vehicle trips, we decided to exclude from our analysis any comparison on vehicle trips.

Personal Travel

Although ATS statistics on personal travel are statistically different from those of the NPTS, these statistical differences might not be of any practical significance. With sample sizes up in the tens of thousands, statistical tests can often detect even the slightest differences.

In general, the NPTS estimated fewer person trips, shorter trips, and fewer longdistance PMT than did the ATS. Presumably, the difference in the data collection time intervals (i.e., 2-week versus 12-month) contributes partially to NPTS underestimating the total number of person trips. Also, ATS estimates a larger percentage of trips more than 200 mi in length (round-trip distance) than does NPTS (Figure 2). This discrepancy in trip lengths between the two surveys might be primarily attributable to the different approaches used to calculate trip distances—a zip code-based calculation by the ATS and an MSA-based calculation by the NPTS. As mentioned previously, the former presumably is more precise than the latter.

The fewer and shorter person trips in the NPTS result in an NPTS estimate of PMT which is 27 percent lower than that in the ATS. Another contributing factor to this enormous difference in estimated PMT between the NPTS and the ATS are airplane trips. There are twice as many airplane trips in the ATS as in the NPTS. Plus, ATS airplane trips, which amount to almost 18 percent of the total ATS trips, are 22 percent longer than those in the NPTS.



1995 NPTS versus 1995 ATS

Although NPTS trips by highway modes are 16 percent longer than those in the ATS, airplane trips are so prominent in the ATS that the NPTS highway trips are not long enough to "offset" the sizable airplane PMT in the ATS. Figure 3 displays estimated trip lengths (based on round trips) from both surveys categorized by highway, airplane and "other" modes. The "other" mode category is a "catch-all" category including some highway modes (e.g., charter bus) and private plane, which can not be individually categorized in the NPTS. Also, Figure 3 gives the corresponding 95 percent confidence intervals using the standard errors of the NPTS estimates. Based on a hypothesis test at $\alpha = 0.05$, the difference in airplane-trip distances between the two surveys is outside the range of statistical noise.

Trip Purposes

The NPTS and the ATS are relatively alike with respect to *why* people take long trips, except for trips characterized as "school" (Figure 4). The ATS includes all trips for the purpose of attending school-related activities, while the NPTS includes similar trips as well as trips to school, college, or university classes. An attempt was made to identify from the ATS college students living in dormitories, and to remove their data from our analysis. Unfortunately, there is no specific information in the ATS indicating whether a college student was living in a dormitory during the survey period. A set of coarse criteria were used to identify these students: a person who indicated that he/she was a student *and* that he/she lived in a rooming house. Interestingly, students who met these two criteria were all between the ages of 18 and 22, suggesting the reasonableness of these criteria. Nonetheless, we believe these criteria were not precise enough to identify all of the college students living in dormitories. This is because the students we identified only



FIGURE 3 Trip length by highway, air and other modes 1995 NPTS versus 1995 ATS.

account for 0.01 percent of the total civilian population while the U.S. Bureau of Census reported a corresponding 0.8 percent (Bureau of the Census, 1998). If all of these students were not removed from the ATS data, then it is possible that the ATS captured more "school" trips than did the NPTS.

Mode Choice

There are more discrepancies in the mode choice estimates between the two surveys than there are in trip purposes. As indicated previously, there are not only more than twice as many airplane trips in the ATS than in the NPTS (Table 5), ATS airplane trips are also 22 percent longer than those in the NPTS. Our simulation results suggest that the difference



FIGURE 4 Person-trip distribution by trip purpose 1995 NPTS versus 1995 original ATS versus ATS 2-week simulation.

in the data collection time interval (e.g., 2-week versus 12-month) is irrelevant to the discrepancy in airplane trip statistics. That said, why the NPTS overlooked so many airline trips deserves further investigation. Comparisons on certain modes such as biking, are afflicted by small sample sizes and, thus, the validity of any comparisons of these modes is highly questionable.

Analysis results on summary person travel statistics suggest that the NPTS and ATS are not entirely comparable, particularly in the propensity to take long-distance trips, the prevalence of airplane trips, and the distribution of trip distances. The different data collection intervals in the surveys (i.e., 2-week versus 12-month) probably contributes to these differences. To better understand its impact on survey results, we conducted a simulation where the NPTS' protocol of a 2-week time interval was applied to the ATS data.

	NDTC	ATS		
	NP15	Original	2-Week Simulation ²	
TOTAL	912,750,040	996,483,563	821,162,404	
	(100.00%)	(100.00%)	(100.00%)	
POV	806,926,540	786,350,938	648,754,672	
	(88.41%)	(78.91%)	(78.99%)	
Bus	18,185,202	3,267,036	2,226,729	
	(1.99%)	(0.33%)	(0.27%)	
Other Public Transit	1,101,206		_	
	(0.12%)			
Intercity Rail	3,700,453	4,586,879	3,653,515	
	(0.41%)	(0.46%)	(0.44%)	
Airplane	72,940,014	176,898,173	146,152,810	
	(7.99%)	(17.75%)	(17.80%)	
Bike	1,809	41,946	98,970	
	(0%)	(0%)	(0.01%)	
School Bus	1,984,577	2,954,162	2,739,062	
	(0.22%)	(0.30%)	(0.33%)	
Taxi	_	155,700	135,527	
		(0.02%)	(0.02%)	
Other	7,128,375	22,228,730	17,560,750 (2.14%)	
	(0.79%)	(2.23%)		
Unreported	781,865			
	(0.09%)			

TABLE 5 Distribution of Person Trips by Mode¹ 1995 NPTS Versus 1995 OriginalATS, Versus ATS 2-Week Simulation

¹ Refer to Table 2 for mode definitions.

² Mean of 10 simulation runs.

SIMULATIONS

Based on the information on *when* individual long trips were concluded, we reconstructed the ATS data by randomly assigning each sample household a designated travel day. Only round-trips to places 100 mi or more from home and in which the traveler returned home during a 2-week period leading up to the designated travel day were included. This criterion assures that simulation results are based on comparable data. The simulation was repeated 10 times, and the means and standard errors of these 10 simulations are data. The simulations are used in our analysis.

Simulation results suggest that a data-collection protocol with a 12-month interval has no impact on why or how people take long distance travel. The mode and trippurpose distributions of these trips are in Table 5 and Figure 4. Similarly, the length of the data collection period has virtually no impact on the trip length distribution (Figure 2). Regardless of the time interval from which long trip data were collected, the prevalence of airplane trips persists even in the simulated ATS data—one in every six long-distance trips is by airplane.

The most noticeable impacts of different data collection intervals (i.e., 2-week versus 12-month) on survey results are

- Overall magnitude of long-distance travel, and
- Estimated number of people who travel on long-distance trips.

Based on simulated ATS data, the estimate is that 821 million long-distance trips were taken by Americans in 1995, compared to 913 million by the NPTS and 996 million by the original ATS (Table 5). By restricting data collection to a 2-week window, 11 percent fewer long-distance trips are estimated. This finding suggests that a data-collection period of 2 weeks captures fewer long-distance trips than one with a 12-month period. Without a doubt, the latter should produce a more realistic estimate of overall trip frequency.

Restricting the data collection effort to a 2-week window also substantially underestimates the number of people who take long-distance trips and their trip frequency (Table 6). If observed throughout the year, almost 6 in every 10 Americans take at least one long-distance trip a year. However, if observed for a 2-week period, only one in every seven Americans traveled long distance in 1995. Compared to a third source, this figure is exceedingly low. According to the 1993 Air Travel Survey of more than 3,000 respondents aged 18 and older (Air Transport Association, 1994), approximately onethird of the respondents reportedly have flown on a commercial airline in a 12-month period. Although this might be a biased sample of people more likely to travel on airplanes, the estimate provides a stark contrast to estimate-based on the NPTS data.

For those who reported long-distance travel, a 2-week data collection window finds that the majority of them take only one long trip a year, and less than 2 percent take more than four trips a year. This distribution is remarkably different from one with a 12-month data collection window (Table 6). This finding can only partially support our early hypothesis where we speculated that the 2-week time frame will be more likely than the 12-month time frame to capture trips taken by frequent travelers and to omit those taken by infrequent travelers. This is because "frequent" travelers cannot be explicitly identified if the observation period is limited to only 2 weeks. However, it is probably fairly certain that almost all of the 29,000 travelers who reported at least one long-distance trip during a 2-week period are among those who took at least four long-distance trips a year.

This simulation confirms that the length of the time period from which longdistance travel data are collected has a significant bearing on the estimated propensity to travel long distance. This finding is true with respect to both the estimated total number of long-distance trips and the estimated number of persons who travel long distance. A 2-week data collection scheme clearly underestimates the frequency of long-distance travel and the number of people who travel long distance. However, the length of the data collection period has little bearing on the characteristics of these trips in terms of trip purposes and modes used. The relatively great frequency of airplane trips in the ATS cannot be explained by the different-length data collection periods in the two surveys. Airplane trips remain an issue that warrants further analysis.

		ATS	
	NPTS	Original	2-Week
		_	Simulation ¹
Persons (5+)	241,675,000	246,097,285	245,946,000 ²
	(100%)	(100%)	(100%)
Persons did not travel long-	212,857,151	91,515,180	217,982,133
distance	(88.1%)	(37.2%)	(88.6%)
Persons travel long-distance	28,817,849	154,582,105	28,015,867
	(11.9%)	(62.8%)	(11.4%)
Persons by Nun	nber of Long-Dista	nce Trips Taken	
One Trip	24,395,680	26,858,939	23,409,811
	(84.65%)	(17.38%)	(83.56%)
Two trips	3,390,412	26,305,131	3,511,591
_	(11.76%)	(17.02%)	(12.53%)
Three trips	552,848 (1.92%)) 19,231,962	716,427
_		(12.44%)	(2.56%)
Four or more trips	478,909 (1.66%)) 82,186,073	378,037
-		(53.17%)	(1.35%)

TABLE 6 Distribution of Travelers by Trips Taken—1995 NPTS Versus 1995Original ATS, Versus ATS 2-Week Simulation

¹ Mean of 10 simulation runs.

² Without college students.

CONCLUDING REMARKS AND RECOMMENDATIONS

After removing as many differences between the two surveys as possible, the NPTS and the ATS basically drew their samples from a similar population with respect to age, gender, geography, education, and household size. However, a slightly larger percentage of the ATS households were in low-income categories than those in NPTS. Different income definitions and sampling frames contributed to this discrepancy.

To have a consistent basis for comparing the two surveys, only round-trips 100 mi or longer one-way were used in our analysis. Furthermore, attempts were made, as much as data can support, to align the definitions of trip purposes and travel modes, and to remove other differences between the two surveys. Despite the effort to synchronize the two surveys, the impact of the different data-collection time periods cannot be reduced. While ATS respondents reported their long-distance travel for an entire 12-month period, NPTS respondents reported their trips concluded during a 2-week period. Results from our simulation study confirm that limiting data collection to a 2-week period definitely underestimates the overall extent of long distance travel in the United States and presents an inaccurate profile of long-distance travelers.

Vehicle trips were defined very differently in the two surveys. The NPTS used a set of heuristic rules to determine whether a person trip qualified as a vehicle trip. Similarly, a set of different but equally heuristic rules were used in the ATS to determine vehicle trip status. The heuristic nature of these approaches hinders any reliable comparisons on vehicle trips. As a result, these comparisons are excluded from this analysis.

Our analyses on person trips found that the NPTS estimated not only fewer person trips but also shorter trips than did the ATS. These results lead to an NPTS estimate of PMT which is 27 percent lower than that in the ATS. Two factors contribute to this enormous difference in PMT estimate. First, the two surveys used different approaches to calculate trip distances—a zip code-based approach by the ATS and an MSA-based approach by the NPTS. Second, there are twice as many airplane trips in the ATS as in the NPTS. Moreover, ATS airplane trips are 22 percent longer than those in the NPTS. There is no noteworthy difference between the two surveys regarding *why* people travel long distance, except trips for the purpose of attending school-related activities. Possible explanations for this latter difference are the inclusion of college students in the ATS but not in the NPTS, and the difference in defining "school" trips.

After we appropriately weighted the sample data, both ATS and NPTS produce overall travel statistics (i.e., total number of person trips, PMT, trip distribution by mode and by purpose) that are not exactly identical but that are at least similar. From that perspective, it is probably reasonable to recommend replacing 1995 NPTS long trips (those 100 mi or longer one-way) by 1995 ATS long trips. It is probably also reasonable to recommend combining daily trips collected in the 1995 NPTS and the 1995 ATS long-distance trips to portray the overall trends in personal travel—both "the long and the short of it." Using this combined database to characterize overall personal travel beyond the "basic" singular dimensions (e.g., travel modes and trip purposes) is not as straightforward and probably requires the development of a mathematical linkage where travel behavior (e.g., propensity to travel, mode choice, and trip purpose) is a function of major travel determinants (e.g., income, life cycle). That said, future NPTS and ATS should be designed and implemented with "consistency" in mind. Consistency in population, definitions, scope, and survey method is essential to successfully using the NPTS and the ATS together.

Results from our simulation study indicate that a 2-week data collection period clearly under-estimates long-distance travel—with respect to the total number of long distance trips, the number of people who travel long distance, and the trip frequency of individual travelers. It is evident that a 12-month data collection period such as that used in the 1995 ATS is more appropriate than use of shorter time periods to collect data on infrequent trips. Should the data collection time period in future ATS be reduced to less than a full year, then it is imperative that factors to expand the ATS sample data—trip data in particular—be developed so that the varying probabilities of taking long-distance trips among individuals are sufficiently taken into account.

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