

# Data Watch

## The American Time Use Survey

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This section will offer a description of data sources that may be of interest to economists. The purpose is to describe what data are available from those sources, what questions can be addressed because of the unique features of the data and how an interested reader can gain access to the data. Suggestions for data sources that might be discussed here (or comments on past columns) can be sent to Katharine G. Abraham, c/o Data Watch, *Journal of Economic Perspectives*, Joint Program in Survey Methodology, University of Maryland, 1218 Lefrak Hall, College Park, Maryland 20742-8241.

### **A Brief History of Research on Time Budgets**

How people allocate the 24 hours that they have in each day has important implications for their financial security, physical health, emotional well-being and general level of happiness. In the last quarter century, the United States has been in the rearguard of the collection of time-use data. But in January 2003, the U.S. Bureau of Labor Statistics began a major new initiative in gathering data on how Americans spend their time—the American Time Use Survey (ATUS).

The best way to collect data on how people spend time is to obtain time-diary information directly from individuals with as short a lag as possible. Retrospective

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reports of time use are seriously affected by recall bias and internal inconsistencies (Robinson, 1985). However, time-budget studies that ask respondents to report sequentially what they did on the current or previous day force the total time devoted to primary activities to equal exactly 24 hours per day for each person, and the short recall period minimizes recall bias.

Time budgets have been occasionally collected in the United States since at least the 1920s (Sorokin and Berger, 1939). There have been a few American time-budget surveys in the post-World War II period, including in 1965–1966 and 1975–1976 (with a small extension in 1981) (Juster and Stafford, 1985). Small-scale time-budget surveys were conducted in 1985, 1992–1994, 1995 and 2000, and studies focusing particularly on child-care and children were done as part of the Panel Study of Income Dynamics in 1997 and 2002.

While all of these studies were funded by federal agencies, none was designed or conducted by any part of the federal statistical system. The surveys differed from one another in sample design, in the number of diary-days sampled per individual, in the number and kinds of different codes used to categorize activities, and in the ages of respondents to whom the sampling frame applied. Perhaps most important for researchers, the surveys have typically been quite small—never more than 8,000 diary-days (1992–1994)—and have been conducted on an irregular basis.

Internationally, Sándor Szalai and his collaborators (1972) organized time-use surveys in the 1960s in a number of countries. Other countries' statistical agencies, particularly those of Australia, Canada, Germany and Korea, have conducted much larger-scale, albeit only quinquennial or decennial, time-budget surveys in recent years. While more useful in answering research questions than past U.S. surveys, all except the Korean survey obtained time budgets from fewer than 10,000 households, thus making it difficult to analyze questions pertaining to specific demographic groups; and the Korean survey and several others have no or extremely sparse information on wages and incomes.

## **Description of the American Time Use Survey**

The American Time Use Survey is the culmination of a design and development effort that lasted nearly ten years, including a pilot study in 1997 and full-scale field testing in 2002 (Horrigan and Herz, 2005). The ATUS uses a random sample drawn from households that have recently completed their participation in the Current Population Survey (CPS). Thus, for example, a household that had been included in the CPS in January through April 2002 (Month-in-Sample 1–4) and January through April 2003 (Month-in-Sample 5–8) was eligible for inclusion in the June, July or August 2003 ATUS. Sample households are selected based on the characteristics of the CPS reference person, and the respondent is then randomly selected from the list of adult (age 15 or older) household members. All adults within a household have the same probability of being selected. During 2003, the ATUS collected over 1,700 diaries per

month. Beginning in January 2004, the sample size was reduced to approximately 1,100 per month, a rate that is expected to continue indefinitely.

The American Time Use Survey is administered using computer-assisted telephone interviewing, rather than paper diaries as in many other countries. All ATUS respondents are assigned an initial diary day and are called on the following day. If the respondent is unavailable on that day, subsequent contact attempts are made on the same day of subsequent weeks. This procedure maintains the proportional assignment of respondents to days of the week.

The core time diary of the ATUS is very similar to other time-budget surveys. The respondent is asked to take the interviewer through his or her day from 4 AM through 4 AM of the following day (the interview day). The respondent describes each activity, which the interviewer either records verbatim or, for a limited set of commonly performed activities (such as sleeping or watching television), hits a precode button. The verbatim responses are coded to a three-tier scheme, going from top-level category of activity, to sub-categories, to descriptions of very specific actions that together are considered to comprise a single third-tier activity. Only the respondent's primary activity is recorded and coded; if the respondent mentions secondary activities performed simultaneously, these are recorded but are not included in the total time inputs and are not classified using the three-tier scheme. For each episode, the ATUS collects either the ending time or the duration of the activity. In addition, for each activity the survey asks where the respondent was and with whom, unless the activity is sleeping or grooming (neither location nor with whom is asked) or working at a job (only location is asked). The "who" codes for household members refer to specific individuals.

Although the researcher can aggregate the basic third-tier activity codes as desired, the ATUS aggregates them into the 17 top-level categories listed in Table 1. The second through fifth columns in the Table present the person-day-weighted average total time spent in each top-level category by all men and women, and by prime-age men and women employed full-time. From the second and third columns we see (not surprisingly) that women do an hour more of household activities per day than men, devote 22 minutes more to care of household members and enjoy 22 minutes less leisure, but work  $1\frac{1}{2}$  fewer hours in the market and spend 25 minutes more in personal care (with less than half of this difference due to their sleeping more). While the difference in market work time is less among prime-age full-time workers, the gender difference in leisure time is greater, as is that in time spent in personal care.

Table 2 illustrates the amount of detail available in the ATUS by presenting the second- and third-tier categories for one of the more briefly categorized (although quantitatively more important) top-level activities, "Household Activities." The detail is extremely narrow. While most of the third-tier activity codes will contain zeros for most respondents, over the years the sample will be sufficiently large to allow studying the fine details of human activity.

After the time diary has been completed, the American Time Use Survey asks several summary questions that obtain information on child care, paid work

Table 1

**Time in First-Tier Activities in the ATUS, 2003, Hours per Day**

<i>First-tier activity</i>	<i>All men</i>	<i>All women</i>	<i>Men 25–54 employed full-time</i>	<i>Women 25–54 employed full-time</i>
Personal care	9.11	9.52*	8.63	9.15*
Household activities	1.35	2.34*	1.23	1.90*
Caring for and helping household members	0.28	0.64*	0.42	0.60*
Caring for and helping nonhousehold members	0.17	0.22*	0.12	0.15
Working and work-related activities	4.18	2.66*	6.17	5.28*
Education	0.41	0.46	0.05	0.08*
Consumer purchases	0.32	0.48*	0.32	0.45*
Professional and personal care services	0.07	0.11*	0.05	0.10*
Household services	0.02	0.02	0.02	0.01
Government services and civic obligations	0.00	0.01	0.00	0.01
Eating and drinking	1.12	1.06*	1.11	1.03*
Socializing, relaxing and leisure	4.73	4.37*	3.71	3.19*
Sports, exercise and recreation	0.43	0.24*	0.38	0.22*
Religious and spiritual activities	0.12	0.16*	0.10	0.13
Volunteer activities	0.13	0.14	0.10	0.10
Telephone calls	0.07	0.17*	0.05	0.11*
Traveling	1.34	1.24*	1.44	1.39
Uncodeable	0.13	0.15*	0.10	0.10

\*Difference between men and women significant at the 5 percent level.

and volunteering that cannot readily be obtained from the core time diary. In the course of developing the survey, the staff of the Bureau of Labor Statistics realized that child-care activities dwarf all other housework that people perform secondarily. Examination of data on secondary activities from the Australian National Time-Use Survey indicates that individuals with children present spent three to four times as much time in child care as they did in other household work. Accordingly, the ATUS asks about care of children under age 13 that is done as a secondary activity, beginning by asking when the first child under 13 in the household woke up and when the last one went to bed. After establishing these bounds, ATUS asks respondents to identify the activities during which a child under 13 was “in your care.”

Summary questions about paid work identify activities that are done for the respondent’s main or secondary job. These include things like bringing paperwork home or taking clients out to dinner. The questions also help to identify work activities of self-employed respondents who work out of their homes and may intermix work and nonwork activities. The last set of summary questions asks respondents to identify any volunteer activities that they did for an organization.

Because respondents on trips away from home are usually not available to answer the survey, the ATUS asks questions about days away from home and the purpose of the absences. These data should help researchers understand what is lost during periods when respondents cannot be contacted (Frazis and Stewart,

Table 2

**Detailed Activity Codes for First-Tier Activity: Household Activities***Second- and third-tier codes under "Household Activities"*

- 
- 01 Housework
    - 01 Interior cleaning
    - 02 Laundry
    - 03 Sewing, repairing
    - 04 Storing interior household items, including food
    - 99 Housework, n.e.c.
  - 02 Food and drink preparation, presentation and clean-up
    - 01 Food and drink preparation
    - 02 Food presentation
    - 03 Kitchen and food clean-up
    - 99 Food and drink preparation, presentation and clean-up, n.e.c.
  - 03 Interior maintenance, repair and decoration
    - 01 Interior arrangement, decoration and repairs
    - 02 Building and repairing furniture
    - 03 Maintaining heating and cooling systems
    - 99 Interior maintenance, repair and decoration, n.e.c.
  - 04 Exterior maintenance, repair and decoration
    - 01 Exterior cleaning
    - 02 Exterior repair, improvements and decoration
    - 99 Exterior maintenance, repair and decoration, n.e.c.
  - 05 Lawn, garden and houseplants
    - 01 Lawn, garden and houseplant care
    - 02 Ponds, pools and hot tubs
    - 99 Lawn and garden, n.e.c.
  - 06 Animals and pets
    - 01 Care for animals and pets (not veterinary care)
    - 99 Pet and animal care, n.e.c.
  - 07 Vehicles
    - 01 Vehicle repair and maintenance (by self)
    - 99 Vehicles, n.e.c.
  - 08 Appliances and tools
    - 01 Appliance and tool set-up, repair and maintenance (by self)
    - 99 Appliances and tools, n.e.c.
  - 09 Household management
    - 01 Financial management
    - 02 Household and personal organization and planning
    - 03 Household and personal mail and messages (except email)
    - 04 Household and personal email
    - 05 Home security
    - 99 Household management, n.e.c.
- 

2003). The ATUS asks respondents to report the number of absences from home that lasted two nights or longer during the month before the initial calling date and the purpose and number of nights away from home.<sup>1</sup> Due to programming difficulties, these data will not be available in the 2003 and 2004 data files.

<sup>1</sup> The ATUS does not call these absences "trips," because they could be hospital stays or jail time. It does not ask about one-night absences, because the core time diary captures them.

Since the American Time Use Survey uses the Current Population Survey as a sampling frame, the ATUS data files contain the same demographic information as the CPS. Demographic information on household members who were present during the final CPS interview is carried over. For new household members, the ATUS collects only age, sex and relationship to the respondent. It updates labor force status using an abbreviated version of the basic CPS questionnaire and also updates information on usual hours of work, class of worker, industry, occupation, earnings and school enrollment. In addition, it collects basic labor market information (whether employed or not and total hours worked in the market) for the respondent's spouse or unmarried partner.

As a large-scale and on-going time-budget survey, the ATUS is unique worldwide. Several other countries' time-budget data sets are large enough to generate reliable measures of time allocation. No other country, however, has created a large-scale, continuous set of time budgets. The United States has moved from the rearguard to the vanguard of data collection on time use.

The Bureau of Labor Statistics has made the 2003 ATUS available to users, both as episode data—the daily timelines of activities of each respondent—and in summary form—time spent over the day in each of the detailed third-tier activities. Public-use data files are available by logging on to (<http://www.bls.gov/tus/>); and the survey staff can be contacted at ([ATUSInfo@bls.gov](mailto:ATUSInfo@bls.gov)). Additional years of data will also be available as public-use files shortly after their collection.

## **Desiderata and Problems**

Most of the American predecessors of the American Time Use Survey also collected time budgets from one household member, although the 1975–1976 Time Use Survey did obtain diaries from both spouses (in a married-couple household). Collecting diaries from multiple household members is increasingly common in other countries (for example, recent surveys in Australia, Germany and Korea). With much greater funding, it would be possible to obtain time budgets from several (or even all) household members. Limits on funding, concerns about the effect on response rates and the reduction in sampling error by enlarging the number of households surveyed led to the limitation of one person per household.

The ATUS asks each respondent for a time budget for only one day. (Here again, among U.S. surveys only the 1975–1976 survey obtained diaries on more than one day, although the leading recent international time-budget surveys have obtained two days of budgets from each respondent.) The benefit of obtaining diaries on multiple days is a potential reduction in sampling cost per budget, although asking for more effort from respondents may reduce response rates, and the number of persons in each demographic cell is reduced. In the end, much depends on whether interday or interpersonal heterogeneity is greater.

The greatest difficulty with the ATUS thus far has been the low response rate. Response rates in the earlier U.S. studies were also low, and the problem has gotten

worse over time: rates fell from 72 percent in the studies of 1960s and 1970s to 63 percent in the 1992–1994 study (Egerton, Fisher and Gershuny, 2004) to 58 percent in the ATUS for 2003. If nonrespondents were distributed randomly conditional on observable characteristics, it would be a simple matter to re-weight sample averages of time allocations to account for differential nonresponse (remember that, because the nonrespondents were in the Current Population Survey recently, we know their demographic/economic characteristics quite well). The difficulty is that an individual's nonresponse probability may also depend on unobservable characteristics that are correlated with time use. For example, sampled individuals who are unusually busy (more market work time, more household work time), conditional upon their observable characteristics, may be less likely to respond. There is no simple way to adjust for nonrandom nonresponse related to unobservables. Recognizing this potential difficulty, the Bureau of Labor Statistics has undertaken studies to determine the reasons for the unexpectedly low response rates and their effects on time-use estimates (Horigan and Herz, 2005). Interestingly, people who reported working more than 45 hours per week in their final (Month-in-Sample 8) CPS interview were more likely to respond than those working shorter hours.

A final serious concern is the extent to which the ATUS ignores “secondary” activities. The Bureau of Labor Statistics has made major efforts (far more than the U.S. precursor studies) to ensure uniformity in coding the respondents' descriptions of their primary activities and has allowed for the most detailed set of basic codes ever used in a time-budget survey. Moreover, the extra effort to obtain information on child-care activities that are undertaken simultaneously with other activities reduces this problem to some extent. However, because BLS decided against trying to elicit information about secondary activities generally and only records such activities if the respondent offers that he/she was engaged in something else simultaneously with the primary activity, some important activities may be missed. BLS is examining the feasibility of systematically collecting information on secondary activities.

## **Potential Uses**

The American Time Use Survey will provide tools for empirical analyses of topics that could not heretofore have been examined at all or that at least could not have been examined for the United States. Here we list just a few areas where we believe the ATUS can play a unique role. We first list some topics that might be viewed as stemming from concerns about macroeconomic and related issues, then some pertaining to questions in labor and demographic economics. Within these two areas there are undoubtedly many other specific problems that are immediately apparent to readers on which the ATUS data can shed light; and there are other broad economic and related topics for which the ATUS is useful but that we neglect in this brief overview.

Time-use data can shed light on an important economic measure: hours

worked in the labor market. Weekly hours reported retrospectively in the Current Population Survey exceed those reported at the same time in the few U.S. time-budget studies. This leads to a concern that the effort devoted to market activity may be consistently overstated (Juster and Stafford, 1991, for the United States, Hamermesh and Lee, 2003, for Canada and Korea). More important, there is some evidence that the discrepancy between time-diary estimates and estimates from retrospective questions has grown over time (Robinson and Bostrom, 1994). Measuring these differences is crucial to measuring productivity change and to understanding the evolution of economic welfare. Frazis and Stewart (2004) use ATUS data to show that CPS hours are reported accurately, at least for the CPS reference week. They also find that average weekly hours are lower in non-CPS reference weeks, indicating that CPS hours should not be used to estimate the total number of hours worked in a month or year.

Statistical agencies in many countries have attempted to construct “satellite” national accounts of household production to accompany their national income and product accounts (NIPA). Such accounts are designed to measure the value of activities that are not performed in the market and are thus by definition excluded from the NIPA. Clearly, the crucial input into satellite accounts is information on how time is spent at home. Because the ATUS uniquely provides large annual samples, it offers the wherewithal to generate annually updated satellite national accounts, and thus the potential to track trends and cycles in total production, both market and nonmarket. Its availability should provide a needed spur to addressing the difficult issues involved in valuing home-produced outputs (Abraham and Mackie, 2005).

Substantial research work has incorporated household production into macroeconomic models (for example, Benhabib, Rogerson and Wright, 1991). Yet the empirical examination in that literature has been based entirely on the small 1975–1976 Time Use Survey. With continuous data, researchers will be able to analyze how shocks that differentially affect the market and nonmarket sectors result in substitution between market and nonmarket work. Researchers will also be able to investigate how different types of household production activities vary over the business cycle. Moreover, as time away from work during the workday and (to some extent) breaks at the workplace are recorded, researchers will be able to account for changes in actual hours of market work over the cycle, holding conventionally measured hours of market work constant.

The large samples will also allow us to examine the activities of the unemployed—the extent to which possibly rationed market work is compensated by substitution toward household production, as opposed to leisure (Ahn, Jimeno and Ugidos, 2005). We can also examine how changes in aggregate unemployment affect the mix of people’s nonmarket activities. The duration of unemployment is collected in the Current Population Survey but not in the ATUS, so that with some measurement error caused by intervening spells of employment, analysts observing persons who are unemployed in both surveys can examine how the length of unemployment spells affects nonmarket and job-search activities.



An important input into the U.S. financial system is the quantity and quality of time that Americans devote to managing their investments and, more generally, managing their money. The few available analyses of financial literacy are based on outcomes (test scores) and their correlates (for example, Kotlikoff and Bernheim, 2001). The underlying process by which what one might call financial human capital is created has not been examined, nor could it have been. One of the third-tier categories of time use in the ATUS is “financial management,” which includes activities described as “filling out tax forms,” “making a budget” and many others. Data on this activity might enable researchers to generate measures of the amount of investment in this kind of capital and, because of the information on the interpersonal context of most activities, on the extent of household members’ joint production of this form of human capital.

For labor and demographic economists, the ATUS will provide a wealth of useful information. Household bargaining and its outcomes have preoccupied students of family behavior. The absence of time-budget information on both spouses in ATUS households obviates the analysis of idiosyncratic family behavior; but the samples are large enough to allow the construction of large numbers of small cells containing information on matched pairs of observationally identical representative husbands/wives. Moreover, some information on the spouse whose time diary is not collected is available from the data on his/her market work and earnings from the CPS questionnaire for Month-in-Sample 8 and from the update of employment status and work hours in the ATUS, thus allowing some analysis of idiosyncratic behavior within couples.

The home is one of the three major loci, beside schools and workplaces, for the formation of human capital. Educational production functions have been studied (albeit with inconclusive results); and workplace training has been examined at length; but our ability to analyze how parents invest in their children’s human capital by spending time with them has usually been limited by the need to rely on retrospective questions that provide only general information. With the detailed ATUS codes and information on the identities of those present during each activity, researchers should be able to generate information on inputs into parental investments in children and to analyze their determinants. Linked with geographic data on school inputs and measures of households’ purchases of goods and services related to child development, this information may be relevant for the literature evaluating school productivity. Since investment in one’s children is an important mechanism that generates inequality across generations, the ATUS should be useful for expanding that literature too.

Adults also invest in their own human capital at home. An estimate for Germany suggests that the average adult spends over 30 minutes per day in activities that can be viewed as informal education and that such activity complements prior investment in formal schooling (Fahr, 2005). What determines the size of these investments? How do they substitute for or complement other home activities, particularly investment in one’s children’s human

capital? How do they relate to one's spouse's amount of and commitment to market work? Most generally, for what share of total investment in human capital do they account?

An empirical literature on the role of "social capital" has blossomed in economics since the early 1990s. Yet identifying the role of social capital in behavior is difficult (Durlauf, 2002). Part of the problem may be that we assume that social capital exists within communities, but we are unable to look inside the actual production function through which this type of capital is produced. We assume it is there, proxy it by presumed correlates, but do not observe the production process. Because the ATUS has data on such detailed activities, on their locus and on the presence of other people during the conduct of the activity, it will provide the basis for delving more deeply into the creation of social capital and thus allow better measurement of this concept.

Many of these research questions relate to concerns about women's roles in the labor market and at home. Indeed, some of the initial impetus for the ATUS stemmed from these concerns. Researchers will surely use the ATUS to tabulate aggregates of time use and compare them by gender and other demographic characteristics. Data will be used by economists (and others) to test hypotheses about women's roles in the labor market and at home.

Probably the most heavily studied parameter describing labor-market behavior is the supply elasticity of labor. Estimates of this parameter (whether from the empirical literature or simply guesses) are used in calibrating macroeconomic models, in evaluating tax policy and in discussing the impacts of a host of labor-market and social policies. The estimates typically come from retrospective responses about how much one worked in the market in the previous week, how much one usually works and/or how many weeks were worked in the previous year. The over-reporting of recall data on hours of market work as compared to time-budget data and its systematic variation by demographic group make it unsurprising that estimates of labor supply elasticities using both retrospective responses and measures based on time diaries kept by the same respondents differ substantially (Klevenmarken, 2005, for Sweden). With a continuing set of time budgets, we can remove some of the uncertainty clouding the estimates of this crucial parameter and provide a better grounding for both basic and policy research in several sub-fields.

The production of health has been the central preoccupation of health economists at least since Grossman (1972). Yet while we know tremendous detail about purchases of health-related goods, information on time inputs into health production has been limited to a few surveys that have elicited retrospective responses about a few categories of health activities. The ATUS has as second-tier categories "Health-related self-care," "Personal care emergencies," "Activities related to household children's health (and to non-household children's health)" and others. All of these can allow health economists to get a picture of time inputs

into health production and their demographic and economic correlates. The information will allow much better testing of theories of investment in health than has heretofore been possible.

Unique to time-budget data is the information they provide on *when* activities occur. Surely, when we do things matters—the existence of premium pay for evening/night or weekend work; the preference for sleeping at night, and other temporal variations in activity suggest this is the case. How the timing of work changes over the cycle and over time, and how it differs across the labor force (Hamermesh, 1999); the determinants of the timing of nonmarket production activities; issues in quantifying the importance of temporal coordination of people's work and consumption activities (Weiss, 1996); and the impacts of legislative changes that ease restrictions on store-opening hours all relate to when people do things. Such questions have barely been addressed using existing U.S. or other countries' time-budget data.

The ATUS fills an important gap in the federal statistical system and in the panoply of American data available to researchers. Along with the topics we have discussed here, time use data seem certain to stimulate theoretical and empirical research along lines that cannot now be envisioned—as did the creation of the major U.S. household panel data sets—as researchers realize the general applicability of this readily available, easily usable and novel data set.

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