“Validating the American Time Use Survey: Does anybody really know what they were doing yesterday?” by Alan B. Krueger, Princeton University  1/28/07

Background

This project will provide information on the accuracy of recalled time-use data collected with the American Time Use Survey (ATUS) instrument. The ATUS is a BLS survey conducted by the Census Bureau. The ATUS began in 2003. The sample consists of sampled individuals age 15 and older from households that have completed 8 months of interviews of the Current Population Survey (CPS). One individual per selected household in the CPS final rotation group is chosen to participate in the ATUS, and this person is interviewed once about his or her time use. The ATUS collects data on how people spend their time: who they were with, where they were, and what activity they were doing beginning at 4:00 AM the day before the interview (yesterday) and ending at 4:00 AM on the day of the interview (today).

According to the BLS web site:

The ATUS can significantly further understanding about the quality of life in the United States. Data are available, for example, on how much time people spend working, sleeping, caring for children, volunteering, commuting, or relaxing.

ECONOMIC: ATUS collects information about time spent doing both paid and unpaid activities. The survey produces new and continuous data on time spent working at home and working on weekends, enabling analyses of trends over time. ATUS data on time spent working is an alternative measure to similar data produced by other surveys. Additionally, in conjunction with earnings data, it might be possible for economists to estimate the value of non-market production — such as housework, volunteer work, and child care — and take into account such measures when developing aggregate output estimates, including GDP.

POLICY AND BUSINESS APPLICATIONS: By having information about how people use their time, Federal, State, and local government lawmakers are able to more fully understand the non-economic, as well as economic, effects of their policy decisions. They also are better able to determine when to develop new or change existing policies to address the changing needs of our society.

SOCIOLICAL: Not only does ATUS describe how people spend their time on various activities, but it also provides information on with whom they spend their time. For example, researchers can determine how much time, on average, a mother or father spends with his or her children, regardless of whether they are socializing, eating, shopping, or doing housework or something else. Likewise, the time spouses spend together, the time people age 15 and older spend with their parents or other family members, and the time people spend with their colleagues or friends can be measured. The ATUS also indicates where people are while working: at a workplace, at home, or somewhere else.

All of this information helps researchers understand how people in the United States today are coping with childcare, the demands of their jobs, their work commutes, their need to relax or exercise, and their religious, volunteer, and other commitments.
Study Design: Summary

This project will consist of two parts. First, about 200 workers will carry around a PDA that will ask questions about their activities in real time for 3 consecutive days. This component is known as Ecological Momentary Assessment (EMA). Second, the same workers will be given a survey that very closely follows the ATUS on each day following the EMA. This survey component will be called the Gallup ATUS (GATUS).

EMA

Subjects will carry a PDA (Sony Zire) for 3 consecutive days, always on a Thursday, Friday and Saturday. These days were selected to encompass work days and a nonwork day. The PDA will prompt individuals to answer questions at times that are selected as follows. Individuals specify a begin time and end time for their day, prior to the beginning of the day. The PDA will beep at random times within 6 equally spaced strata (time intervals) to prompt subjects to answer the questions on the screen. Suppose, for example, the day is set to begin at 5 AM and end at 11 PM, spanning a total of 18 hours. The day will then be divided into six equally spaced 3-hour intervals, and within each interval a random time will be selected for the PDA to beep and prompt subjects to answer the questions displayed on the screen. Thus, for each subject we will have 18 (3 days x 6 beeps per day) responses. For 200 subjects, we will have 3,600 episodes of EMA data, assuming that subjects respond to all of the beeps.

The script for the EMA survey is attached in Appendix A. This can still be revised.

In addition to the self-reports, the EMA component will collect real-time physiological measurements. In particular, respondents will give a saliva sample for a cortisol measurement at each prompt (18 per respondent). In addition, respondents will wear an Actiheart Device that will continuously measure physical activity, caloric expenditure, and heart rate activity. Arthur Stone of Stony Brook University has designed the EMA and the collection of physiological data.

Subjects will be trained on how to use the PDA, how to respond to the questions, and how to use the physiological equipment.

Gallup ATUS

Gallup has taken the BLAISE program from the ATUS questionnaire and converted it for a random digit dial survey for another project by Alan Krueger. The questionnaire is almost identical to the ATUS. (The main difference is that a supplement was added to the end of GATUS that asked respondents how they feel about their experiences during randomly selected episodes of the previous day.) The interviewers were trained with some of the materials used to train BLS interviewers. The same algorithm used to code activities in ATUS will be used to code activities in the GATUS.
Analysis

Conceptually, two issues will be the focus of the analysis. First, assessing the magnitude and direction of bias in aggregate reports of time use by activity. Second, estimating the reliability (signal to noise plus signal ratio) of time-use reports at the individual level.

The 3,000+ moments that were captured with the EMA will be compared with the respondents’ activities, interaction partners, and location from the GATUS. The accuracy of the match will be assessed in each sampled moment (an example from pilot study will be presented in FL). In addition, the overall pattern of time use will be compared between the real-time measurements and the GATUS. The focus will be on identifying and characterizing the types of activities that tend to be under- and over-represented in ATUS compared with the real-time EMA measurements. Person-level reliabilities of time spent in various activities will be reported for selected activities. This is a little tricky given that the EMA is a sample of moments, but percent of the day spent working from EMA, for example, can be regressed on the percent of the day spent working from GATUS to derive an estimate of the reliability of time spent working in ATUS. Finally, I will do some analysis to identify the characteristics of people who tend to be most likely to misreport their time-use – for example, I can regress the person-specific mismatch rate on individual characteristics, such as age, education, sex, etc.

Some Possible Issues

Discrepancies might be due to mistakes in EMA or GATUS. EMA is gold standard.

Multiple responses to activities will probably be more common in EMA.

Do the EMA activities and who with, and where questions correspond well enough to ATUS? An attempt was made to align them. Appendix B reports the BLS major ATUS activities.

The 200 workers will come from a small number of companies, and not be a random sample.

The prompts from EMA may improve respondents’ memories when they respond to ATUS questions. By day 3, however, I suspect that the prompts will fade more into the background, so results can be compared by day to see if there is any trend.

Nonresponse in EMA (skipped beeps) can be an issue.

ATUS has a relatively low response rate for a government survey. I suspect response to be higher in GATUS.
The following graph compares GATUS results for N=4,000 random digit dial sample at ATUS. Similar kinds of graphs will be produced for sampled moments in EMA and GATUS.

Data collection is slow. Only 10 subjects can go through EMA per week because of the limited amount of equipment. Thus, it will take about 5 months to collect the data.

Gallup is collecting information from the subjects that I will not have access to.

It might be possible to get some information from the subjects’ employers. Is this worth the effort?

Pilot results for N=10 (and possibly N=18) workers will be presented in Florida.

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Note: GATUS is for May-August 2006 (N=4,000) and ATUS is for May-August 2004-05.

The above graph is based on the previous study that Gallup conducted for Alan Krueger. It shows relatively high agreement between a phone survey conducted by Gallup that used the GATUS and the ATUS for the two preceding years. This type of graph will be constructed using the GATUS and EMA data for the 200 workers in the proposed study.
Appendix A: EMA Questions

100 Before Prompt. Where were you?
   - Home/Yard
   - Workplace
   - Someone else's home
   - Restaurant/Bar
   - Store
   - Vehicle
   - Other Transportation
   - Outside (away from home)
   - School
   - Library
   - Place of Worship
   - Other

101 Before Prompt. What were you doing? (check all that apply)
   (page 1 of 3)
   - Work
   - Housework
   - Overseeing household services
   - Eating/Drinking
   - Sports, exercise, recreation
   - Socializing, relaxing, leisure

102 Before Prompt. What were you doing? (check all that apply)
   (page 2 of 3)
   - Care/help HH members
   - Care/help non HH members
   - Telephone
   - Sleeping
   - Grooming
   - Religious/Spiritual

103 Before Prompt. What were you doing? (check all that apply)
   (page 3 of 3)
   - Volunteering
   - Traveling
   - Class/for credit
   - Class/not for credit
   - Getting personal service
   - Gov/Civic activities
   - Other
200 Before Prompt. Any social interactions?

yes|no

201 Before Prompt. Who was/were with you? (check all that apply) (page 1 of 3)

☐ Spouse
☐ Unmarried partner
☐ Own child
☐ Grandchild
☐ Parent

202 Before Prompt. Who was/were with you? (check all that apply) (page 2 of 3)

☐ Brother/Sister
☐ Other relative
☐ Roommate
☐ Roomer/Boarder
☐ Friends
☐ Co-workers/Clients

203 Before Prompt. Who was/were with you? (check all that apply) (page 3 of 3)

☐ Neighbors/Acquaintances
☐ Other-Children < 18
☐ Other-18 and older

204 Before Prompt. During the social interaction did you feel (check all that apply)

☐ Comfortable
☐ Left out/ignored
☐ Treated unfairly

205 Before Prompt. Rate the social interaction

Horizontal VAS scale (100 points) Pleasant/Unpleasant
300 Before Prompt. How demanding would you rate your activity?

0 Not at all demanding
1 Slightly demanding
2 Somewhat demanding
3 Fairly demanding
4 Very demanding

301 Before Prompt. Did you feel you could not control important things?

0 Not at all
1 Slightly
2 Somewhat
3 Fairly
4 Very much

302 Before Prompt. How competent did you feel?

0 Not at all
1
2
3
4
5
6 Very competent

303 Before Prompt. Did you feel confident about ability to handle problems?

1 Not at all confident
2 Slightly confident
3 Somewhat confident
4 Fairly confident
5 Very confident

304 Before Prompt. Did you feel things are going your way?

1 Not at all
2 Slightly
3 Somewhat
4 Fairly
5 Very much

305 Before Prompt. Did you feel difficulties piling up so you cannot overcome them?

1 Not at all
2 Slightly
3 Somewhat
4 Fairly
5 Very much

400 Before Prompt. How feeling? Happy?
  Horizontal VAS (100 points) not at all/very much

401 Before Prompt. How feeling? Sad?
  Horizontal VAS (100 points) not at all/very much

402 Before Prompt. How feeling? Angry/Hostile?
  Horizontal VAS (100 points) not at all/very much

403 Before Prompt. How feeling? Tired?
  Horizontal VAS (100 points) not at all/very much

404 Before Prompt. How feeling? Stressed?
  Horizontal VAS (100 points) not at all/very much

405 Before Prompt. How feeling? Interested?
  Horizontal VAS (100 points) not at all/very much

406 Before Prompt. Please rate Pain
  1 None
  2 Mild
  3 Moderate
  4 Severe

500 Before Prompt (In the last 30 minutes. Did you have any caffeine? 
  yes|no

501Message screen :The following questions will ask about the time period between the last time ED beeped you and now. 
  ok
502 SINCE LAST PROMPT. Did you experience any of these (check all that apply)

- Argument
- Work stress
- Traffic jam
- Deadline trouble
- Paying bills
- Running late
- Other
- None

503 SINCE LAST PROMPT. Have you taken any medication

- yes
- no

504 SINCE LAST PROMPT. Have you smoked any cigarettes?

- yes
- no

505 SINCE LAST PROMPT. Have you had any alcoholic beverages?

- yes
- no

600 Now it is time to take a saliva sample. Thank you
### Appendix B: BLS 17 Major Activities, 2005

#### Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours per day, total population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Total, all activities</td>
<td>24.00</td>
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<tr>
<td>Personal care activities</td>
<td>9.43</td>
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<tr>
<td>Sleeping</td>
<td>8.63</td>
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<tr>
<td>Eating and drinking</td>
<td>1.24</td>
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<tr>
<td>Household activities</td>
<td>1.82</td>
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<tr>
<td>Housework</td>
<td>.61</td>
</tr>
<tr>
<td>Food preparation and cleanup</td>
<td>.51</td>
</tr>
<tr>
<td>Lawn and garden care</td>
<td>.20</td>
</tr>
<tr>
<td>Household management</td>
<td>.15</td>
</tr>
<tr>
<td>Purchasing goods and services</td>
<td>.80</td>
</tr>
<tr>
<td>Consumer goods purchases</td>
<td>.41</td>
</tr>
<tr>
<td>Professional and personal care services</td>
<td>.08</td>
</tr>
<tr>
<td>Caring for and helping household members</td>
<td>.54</td>
</tr>
<tr>
<td>Caring for and helping household children</td>
<td>.42</td>
</tr>
<tr>
<td>Caring for and helping non-household members</td>
<td>.23</td>
</tr>
<tr>
<td>Caring for and helping non-household adults</td>
<td>.08</td>
</tr>
<tr>
<td>Working and work-related activities</td>
<td>3.69</td>
</tr>
<tr>
<td>Working</td>
<td>3.35</td>
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<tr>
<td>Educational activities</td>
<td>.45</td>
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<tr>
<td>Attending class</td>
<td>.27</td>
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<tr>
<td>Homework and research</td>
<td>.14</td>
</tr>
<tr>
<td>Organizational, civic, and religious activities</td>
<td>.31</td>
</tr>
<tr>
<td>Religious and spiritual activities</td>
<td>.12</td>
</tr>
<tr>
<td>Volunteering (organizational and civic activities)</td>
<td>.14</td>
</tr>
<tr>
<td>Leisure and sports</td>
<td>5.14</td>
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<tr>
<td>Socializing and communicating</td>
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<tr>
<td>Watching television</td>
<td>2.58</td>
</tr>
<tr>
<td>Participating in sports, exercise, and recreation</td>
<td>.29</td>
</tr>
<tr>
<td>Telephone calls, mail, and e-mail</td>
<td>.18</td>
</tr>
<tr>
<td>Other activities, not elsewhere classified</td>
<td>.17</td>
</tr>
</tbody>
</table>

Note: Travel related to activity is included in the major activity category.