**Online Supplement to the Paper**

**“Understanding Activity Engagement Across Weekdays and Weekend Days: A Multivariate Multiple Discrete-Continuous Modeling Approach”**

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Descriptive Analysis: See footnote 3 of the paper.

**TABLE A.1 Activity Participation (%) by Day for the Analysis Sample**

|  |  |
| --- | --- |
| **Activity Purpose** | **Day of the week** |
| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| Work | 82.3 | 82.9 | 82.4 | 82.6 | 82.5 | 28.6 | 28.6 |
| Education | 1.9 | 1.9 | 1.8 | 1.8 | 1.7 | 1.3 | 1.1 |
| Escort | 25.9 | 26.1 | 25.6 | 25.4 | 25.3 | 15.7 | 15.9 |
| Shopping | 59.5 | 58.6 | 61.3 | 59.4 | 61.3 | 33 | 32.5 |
| Personal business | 26.9 | 26.4 | 25.6 | 25.9 | 26.6 | 13.1 | 13.3 |
| Recreation | 64.9 | 64.7 | 66.4 | 65.7 | 67.8 | 42.3 | 46.4 |
| In-home | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

**TABLE A.2 Mean Duration (Hours) Among Those Participating by Day for the Analysis Sample**

|  |  |
| --- | --- |
| **Activity Purpose** | **Day of the week** |
| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| Work | 32.9 | 33.0 | 32.0 | 32.1 | 32.0 | 8.7 | 8.7 |
| Education | 13.2 | 13.6 | 12.9 | 12.8 | 13.2 | 7.9 | 7.9 |
| Escort | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.5 | 1.4 |
| Shopping | 2.3 | 2.2 | 2.3 | 2.3 | 2.4 | 1.7 | 1.7 |
| Personal business | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 1.7 | 1.7 |
| Recreation | 9.2 | 9.1 | 9.1 | 9.1 | 9.3 | 5.8 | 5.8 |
| In-home | 65.1 | 64.3 | 64.2 | 64.0 | 64.6 | 26.6 | 26.7 |

**TABLE A.3 Description of Records with Missing/Erroneous Data**

(This table should be read along with the text immediately following Table 1 of the paper)

|  |  |
| --- | --- |
| **Person Characteristics** (N=1,780 Adult Workers) | **Household Characteristics** (N=1,218 Households) |
| ***Variable*** | ***Value*** | ***Variable*** | ***Value*** |
| Gender (Valid N=1,764) |  | Household Income (Valid N=642) |  |
| Female | 51.1% | Less than £25K | 22.6% |
| Age (Valid N=1,523) |  | £25K to <£50K | 37.3% |
| 18-29 years | 20.9% | £50K or over | 40.1% |
| 30-39 years | 21.2% | Presence of Children (Valid N=1,162) |  |
| 40-49 years | 22.9% | No child | 60.1% |
| 50-59 years | 23.6% | Average Household Size (Valid N=1,159) | 3.20 |
| 60 years and over | 11.4% | Average Household Vehicles (Valid N=1,075) | 1.62 |
| Student Status (Valid N=1,412) |  |  |  |
| Student | 11.9% |  |  |
| Educational Attainment (Valid N=1,162) |  |  |  |
| Not a college graduate | 70.9% |  |  |
| College graduate or higher | 29.1% |  |  |
| Work Status (Valid N=1,252) |  |  |  |
| Full-time worker | 74.4% |  |  |
| Work Place Location (Valid N=1,073) |  |  |  |
| Same location everyday | 80.2% |  |  |
| Frequency of Bus Use (Valid N=954) |  |  |  |
| At least once a week | 21.0% |  |  |
| Less than once a week | 79.0% |  |  |
| Frequency of Bicycle Use(Valid N=899) |  |  |  |
| At least once a week | 15.2% |  |  |
| Less than once a week | 84.8% |  |  |
| Frequency of Walking (Valid N=872) |  |  |  |
| At least once a week | 65.8% |  |  |
| Less than once a week | 34.2% |  |  |

Note: Descriptive statistics for each segment are computed only for individuals who recorded a valid response for the respective question. Valid sample sizes used for calculation of percentage values are presented in the parentheses.

**TABLE A.4 Average Number of Activities Reported by Day**

(Please see footnote 5 of the paper)

|  |  |
| --- | --- |
| **Diary day** | **Average number of activities reported** |
| 1st | 21.07 |
| 2nd | 21.12 |
| 3rd | 21.31 |
| 4th | 20.92 |
| 5th | 21.80 |
| 6th | 21.64 |
| 7th | 21.11 |

**TABLE A.5 Mean Absolute Percentage Error of Predictions of Participation Shares and Average Duration by Market Segment**

(Supplement to discussion in Section 6 of the paper)

|  |  |
| --- | --- |
| **Segment** | **Mean Absolute Percentage Error of each model within each market segment** |
| **Weekly model (the entire diary)** |
| **Joint** | **Independent** |
| Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) |
| *Gender* |  |  |  |  |
|  Male | 14.3 | 15.3 | 17.1 | 17.3 |
|  Female | 14.5 | 14.8 | 17.8 | 18.8 |
| *Age range* |  |  |  |  |
|  18-29 years old | 14.3 | 15.7 | 17.7 | 15.9 |
|  30-39 years old | 14.9 | 15.7 | 17.1 | 17.7 |
|  40-49 years old | 14.3 | 14.9 | 17.1 | 17.3 |
|  50-59 years old | 15.5 | 15.9 | 16.2 | 17.3 |
|  60 or older | 14.3 | 15.8 | 17.1 | 18.1 |
| *Student status* |  |  |  |  |
|  Non-student | 14.0 | 15.9 | 17.2 | 16.1 |
|  Student | 15.0 | 15.7 | 17.3 | 18.7 |
| *Educational attainment* |  |  |  |  |
|  No degree | 14.1 | 16.6 | 17.1 | 18.8 |
|  College or graduate degree | 14.3 | 17.3 | 18.5 | 17.3 |
| *Work status* |  |  |  |  |
|  Full-time worker | 15.6 | 15.3 | 17.4 | 17.3 |
|  Part-time worker | 14.1 | 15.7 | 17.1 | 17.9 |
| *Work place location* |  |  |  |  |
|  Same location everyday | 15.4 | 15.7 | 18.4 | 17.1 |
|  Different location | 13.2 | 15.6 | 17.6 | 18.3 |
| *Household income* |  |  |  |  |
|  Low income | 13.7 | 15.7 | 16.2 | 17.3 |
|  Medium income | 14.3 | 15.6 | 18.8 | 17.8 |
|  High income | 14.3 | 15.7 | 17.9 | 17.3 |
| *Presence of children* |  |  |  |  |
|  No children | 14.3 | 15.8 | 18.2 | 17.3 |
|  At least one child | 15.0 | 15.7 | 17.0 | 17.8 |
| **Overall** | **14.3** | **15.7** | **17.1** | **17.3** |

**TABLE A.6 Predictions of Participation Shares and Average Duration – Females**

(Supplement to discussion in Section 6 of the paper)

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity purpose** | **Weekly model** **(the entire diary)** | **“One-day” model** **(one random weekday \* 5 plus one random weekend day \* 2)** | **Sample** |
| **Joint** | **Independent** | **Joint** | **Independent** |
| Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) |
| **Weekdays** |  |  |  |  |  |  |  |  |  |  |
|  Work | 86.5 | 35.17 | 88.3 | 37.45 | 76.56 | 27.6 | 74.6 | 26.97 | 82.6 | 32.39 |
|  Education | 2.1 | 8.7 | 2.2 | 8.7 | 1.3 | 17.1 | 1.2 | 17.3 | 1.8 | 13.15 |
|  Escort | 20.5 | 2.97 | 19.14 | 3.04 | 14.2 | 3.13 | 17.5 | 3.16 | 25.7 | 2.02 |
|  Shopping | 61.2 | 2.77 | 61.6 | 2.87 | 54.7 | 2.36 | 57.3 | 2.42 | 59.8 | 2.28 |
|  Personal Business | 22.1 | 2.33 | 20.3 | 2.59 | 21.87 | 1.78 | 25.4 | 1.72 | 26.3 | 2.21 |
|  Recreation | 67.2 | 10.25 | 67.62 | 10.36 | 59.3 | 7.89 | 60.1 | 7.88 | 65.9 | 9.15 |
|  In-home | -- | 59.78 | -- | 59.87 | -- | 66.3 | -- | 66 | 100 | 64.45 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Weekend** |  |  |  |  |  |  |  |  |  |  |
|  Work | 31.3 | 10.2 | 32.63 | 10.56 | 34.6 | 7.31 | 32.9 | 7.21 | 28.6 | 8.68 |
|  Education | 1.9 | 7.5 | 2 | 7.2 | 0.8 | 8.56 | 0.9 | 8.57 | 1.2 | 7.92 |
|  Escort | 14.7 | 1.68 | 15.6 | 1.72 | 10.2 | 2.45 | 9.9 | 2.4 | 15.8 | 1.43 |
|  Shopping | 35.3 | 1.75 | 37 | 1.78 | 30.65 | 1.79 | 31.2 | 1.79 | 33 | 1.69 |
|  Personal Business | 15.8 | 1.56 | 16.53 | 1.42 | 9.8 | 2.02 | 9.4 | 2.09 | 13.2 | 1.72 |
|  Recreation | 48.6 | 6.5 | 48.9 | 6.79 | 37.85 | 7.76 | 38.4 | 8.01 | 44 | 5.81 |
|  In-home | -- | 28.45 | -- | 28.96 | -- | 30.1 | -- | 30.15 | 100 | 26.65 |
| **Mean absolute percentage error** | **14.5** | **14.8** | **17.8** | **18.8** | **21.0** | **21.7** | **24.5** | **22.9** |  |  |

**TABLE A.7 Predictions of Participation Shares and Average Duration – Individuals from a High-Income Household**

(Supplement to discussion in Section 6 of the paper)

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity purpose** | **Weekly model** **(the entire diary)** | **“One-day” model** **(one random weekday \* 5 plus one random weekend day \* 2)** | **Sample** |
| **Joint** | **Independent** | **Joint** | **Independent** |
| Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) | Participation (%) | Average duration (hours) |
| **Weekdays** |  |  |  |  |  |  |  |  |  |  |
|  Work | 86.5 | 34.56 | 87.45 | 36.12 | 76.23 | 27.8 | 74.32 | 28.76 | 82.6 | 32.39 |
|  Education | 2.1 | 8.6 | 2.3 | 8.64 | 1.1 | 16.93 | 1.2 | 17.2 | 1.8 | 13.15 |
|  Escort | 20.5 | 2.97 | 19.2 | 3.01 | 15.4 | 3.11 | 17.7 | 3.15 | 25.7 | 2.02 |
|  Shopping | 62.23 | 2.79 | 62.4 | 2.78 | 52.35 | 2.35 | 56.32 | 2.45 | 59.8 | 2.28 |
|  Personal Business | 22.1 | 2.58 | 20.5 | 2.59 | 22 | 1.79 | 25.41 | 1.73 | 26.3 | 2.21 |
|  Recreation | 66.87 | 9.87 | 67.5 | 10.23 | 59.3 | 7.89 | 60.1 | 7.88 | 65.9 | 9.15 |
|  In-home | -- | 60.36 | -- | 61.32 | -- | 66.42 | -- | 66.84 | 100.0 | 64.45 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Weekend** |  |  |  |  |  |  |  |  |  |  |
|  Work | 31 | 10.23 | 32.1 | 10.32 | 34.6 | 7.34 | 33.24 | 7.34 | 28.6 | 8.68 |
|  Education | 1.9 | 7.5 | 1.98 | 7.42 | 0.9 | 8.55 | 0.9 | 8.6 | 1.2 | 7.92 |
|  Escort | 14.7 | 1.68 | 15.32 | 1.69 | 10 | 2.45 | 9.9 | 2.5 | 15.8 | 1.43 |
|  Shopping | 35 | 1.75 | 37.24 | 1.78 | 32 | 1.83 | 29.56 | 1.82 | 33.0 | 1.69 |
|  Personal Business | 15.7 | 1.48 | 16.3 | 1.44 | 10.2 | 2.02 | 9.5 | 2.06 | 13.2 | 1.72 |
|  Recreation | 48.5 | 6.6 | 48.6 | 6.85 | 38.6 | 7.78 | 3.84 | 7.97 | 44.0 | 5.81 |
|  In-home | -- | 28.32 | -- | 29 | -- | 30.1 | -- | 31.67 | 100.0 | 26.65 |
| **Mean absolute percentage error** | **14.3** | **15.7** | **17.9** | **17.3** | **20.5** | **21.6** | **25.2** | **23.4** |  |  |