# D3

## Empirical re-analysis of the JPSC panel data to identify major factors that affect change of happiness and life satisfaction

Toshisuke OZAWA
National Institute of Advanced Industrial Science and Technology (AIST)
Research Center for Life Cycle Assessment
16-1 Onogawa, Tsukuba, Ibaraki 305-8569 JAPAN
Phone: +81-29-861-8027, FAX: +81-29-861-8118, t.ozawa@aist.go.jp

Patrick HOFSTETTER,
BAO (Büro für Analyse & Ökologie)
Zelghalde 15, 8046 Zurich Switzerland
Phone +41 43 288 53 63; patrick_hofstetter@yahoo.com

**Tsukuba, December 2004**

Table of Contents

## Executive Summary

This Working Paper was delivered as a part of the research project "CHap: $CO_2$-emissions per unit of happiness: a new indicator for sustainable consumption that considers and minimizes rebound effects" that is directed by Hofstetter and Madjar and is a part of the program "Life Cycle Approaches for Sustainable Consumption," launched by SNTT, sponsored by Japanese Ministry of Economics, Trade and Industry (METI), and proposed by Dr. A. Inaba, National Institute of Advanced Industrial Science and Technology (AIST).

The original purpose of AIST (Toshi Ozawa is the responsible person) for FY2003-2004 was to deliver results of statistical analysis on changes in consumption patterns and happiness which will then be used to derive consumption elasticities in the case of introducing new activities, such as cloths dryer, personal computer, and mobile phone, to households. The Institute for Research on Household Economics (IRHE) performs the Japanese Panel Survey of Consumers (JPSC), which includes the variables of time-use data, consumption data, and happiness and life satisfaction. This data set includes cohorts of young Japanese women. The analysis on this JPSC data was executed by AIST with the methodological assistance from Büro für Analyse & Ökologie (BAO).

The main tasks of AIST for this research project for FY2004 was to provide the results of empirical analysis with increased resolution of the estimation capability of the proposed model by removing the noise of variables in order to derive happiness elasticities and consumption elasticities of adopting new technologies. The analysis approach, such as grouping of the samples and the choice of statistical tools will be the same as FY2003. The followings were specific deliverables from AIST for this year:

- D3: Empirical re-analysis of the JPSC panel data to identify major factors that affect change of happiness and life satisfaction

- D5: Re-analysis of the JPSC data by forming more homogenous sub-groups in order to reduce the variance of consumption elasticities and enhancing the robustness of results

This Working Paper delivers D3. In order to identify major factors that affect change of happiness and life satisfaction, we first looked into the correlations between happiness and life satisfaction with life events of young Japanese women using multi-linear regression, which is a cross sectional analysis. We chose ten affecting events based on the results of linear regression and other factors, such as number of observations. Then, we performed panel analyses by stratifying the sample into those who experienced the affecting events and those who did not, respectively. Among the ten events chosen, getting married was the only event which showed statistically significant difference in happiness. The results from the panel analysis suggested a distinguished shift in young Japanese women's happiness and life satisfaction for limited concerned target groups do exist and forming sub-groups by life events and attributes helps distinguish the characteristics of homogenous target groups for further analyses.

Although the main purpose of this Working Paper is to identify major factors that affect change of happiness and life satisfaction, we also analysed the effects of these major factors on young Japanese women's consumption patterns. We attempt to answer the following questions: Are young Japanese women a homogenous group of consumers? What common characteristics does this group have? And what additional variables allow for additional grouping with less heterogeneity in happiness and consumption behaviour? The results from the panel analysis showed for concerned target groups a distinguished shift in young Japanese women's consumption patterns using JPSC data and forming homogenous sub-groups by life events and attributes. Although considerable heterogeneity in terms of life stages, major life happenings, income and level and type of consumption have been found, the number of significant changes in consumption activities attributable to defined subgroups remains large. This suggests that dividing the data samples according to attributes may be necessary to minimize the variances of the calculated elasticities, which in turn, estimates the accurate amount of $CO_2$ emissions.

## 1. Introduction

How should we alter consumption towards more sustainable consumption patterns if we do not know the effect of such alterations? Consumer research looked into how to alter consumption for many years and established numerous sets of archetypical consumers that represent larger groups of consumers. Much of this research has been directed by the questions of how to shape a product and its advertisement to be attractive to the targeted consumer group(s). However, comparably little efforts have been made to look into the interdependency of consumption activities. These interdependencies of consumption activities can lead to what economists may call rebound effects, i.e., the intentional change in one consumption activity may cause a series of other changes in consumption that may compensate parts or all of the initial benefit of the consumption activity (like saving money, saving time, lowering resource consumption and pollution, etc.).

Hofstetter & Madjar (2003)[1] proposed to develop an indicator so-called "CHap" which considers the impact of consumption activities on happiness and the additional $CO_2$ emissions of the consumption activity itself but also the changes in $CO_2$ emissions for all other activities. The final paper of Hofstetter and Madjar will not only report on results that look into consumption interdependencies but also on the changes in self-reported happiness.

The development of such an indicator consists of three modules: (1) consumption pattern (CP) module; (2) $CO_2$ emission (C) module; and (3) happiness (H) module. First, a quantitative analysis of behavioural aspects of consumption and its consequences on happiness is necessary. The assessment was performed by AIST in 2003 based on three case studies, such as adoption of cloth dryer, personal computer and mobile phone. The choice of these examples was seen as a possibility to test the feasibility of the proposed method. Using panel data on household activities allows deriving consumption elasticities. These elasticities would be useful in predicting changes in consumption patterns. Changes in happiness or life satisfaction were derived from the same data sample.

The analysis from last year drew some insights, such as: (1) the JPSC panel dataset obtained for this study was comprehensive and basically useful for our analysis; and (2) this module produced data that allows empirical calculation of the average direct and indirect rebound effect for the three case studies. This information was highly significant because the rebound effects need to be considered not just for target groups but for all consumers of a service or good. At the same time, there remained some problems. The data contained a great variability even though the selected sample for this study belonged to a similar demographic attributes. Due to this great variability, we could not observe significant differences among the variables, particularly self-reported happiness, in targeted groups. As a result, our discussions were based on the mean values of the data. In order to make our discussions more concrete, it would be helpful if the variances are minimized further by classifying the sample into distinguished target groups (certain attributes, such as demographic, social, economical, geographical, psychological, behavioural attributes, etc.).

The main objective of AIST's tasks for FY2004 is to provide the results of empirical analysis with increased resolution of the estimation capability of the proposed model by removing the noise of variables in order to derive consumption elasticities of adopting new technologies. In order to do so, we made attempt to identify major factors that affect change of happiness using the same dataset. Along with happiness, other self-reported ultimate utility indicators, such as life satisfaction and life standard, were also analyzed. This Working Paper shows how we identified the life events that are correlated with the shifts of happiness, and evaluated the effects of these events to the shift of happiness, life satisfaction and life standard along with consumption patterns of young Japanese women by panel analysis.

## 2. Methods

### 2.1. Used Data and Variables:

The Japanese Panel Survey of Consumers (JPSC) dataset provided by the Institute for Research on Household Economics (IRHE) of Japan was used for this study. The JPSC panel data include the variables of time-use data, consumption data, and happiness and life satisfaction, necessary for our study. The panel cohort consists of 1,500 women of 24-34 years old in 1993 and geographically distributed throughout the nation. The statistical software SPSS v.12.0J was used to perform analysis on the three most recent available data sets (1998, 1999 and 2000).[1] The details on the data are described elsewhere.[1][2][3]

### 2.2. Definitions of Variables

Three self-reported indices for ultimate utility – happiness, life satisfaction and life standard – were used for this analysis. According to the previous studies[4], 'life standard' is a life index determined mainly by economical satisfaction (i.e. income satisfaction), and 'life satisfaction' is a life index determined not only by economic satisfaction but also other factors as a whole, including relationship between spouse, parents and friends. In other words, 'income satisfaction' and 'life standard' are similar economic indices; while 'life satisfaction' is more comprehensive index. 'Happiness' is well studied and considered as even more comprehensive index as a whole. For more details on the use of happiness as an indicator, refer to deliverable D2 provided by Madjar (2004). The values for variables used for this research were measured in five scales as follows:

(1) Happiness:

Question: Do you consider yourself happy or unhappy?

Self-reported scores: 1 = Unhappy, 2 = Rather unhappy, 3 = Average, 4 = Rather happy, 5 = Very happy

(2) Life-satisfaction:

Question: Are you satisfied with your life as a whole?

Self-reported scores: 1 = Unsatisfied, 2 = Rather dissatisfied, 3 = Average, 4 = Rather satisfied, 5 = Satisfied

(3) Life standard

Question: Where do you think your current life standard falls in comparisons with other households?

Self-reported scores: 1 = Low, 2 = Mid-low, 3 = Average, 4 = Mid-high, 5 = High

Apart from self-reported indices for ultimate utility, life happenings variables, status variables, consumption pattern variables were used for this study. Used variables are shown in Table 1 of deliverable 5 (D5) of the Working Paper, 2004.

### 2.3. Data Preparation

The details on data preparation are described in D5 of the Working Paper. Briefly, the used data were prepared as described below:

a. Last year, we used Panels 5 (1997), 6 (1998) and 7 (1999) and combined three data sets in order to increase the sample number. For this year, Panel 8 (2000) newly became available from IRHE. Therefore, we decided to use Panels 6 (1998), Panel 7 (1999) and Panel 8 (2000). For panel analysis, statistical analyses were performed on the combined data of 1998-1999 and 1999-2000 data.
b. For refinement of the data, all the cases were restricted to the individuals who responded to the survey three consecutive years between 1998 and 2000 and contain no missing values for important variables for our particular interest. The most important variables are: (1) happiness; (2) life satisfaction; (3) life standard; (4) possession of cloth dryer; (5) possession of personal computer; and (6) possession of mobile phone. All cases which do not meet the restriction were excluded from the analysis.
c. Time-use data were converted into the unit of minutes.
d. For (1) happiness, (2) life satisfaction, and (3) life standard, the scores were converted. Originally, happiness scores were: 1 = Very happy, 2 = Rather happy, 3 = Average, 4 = Rather unhappy, 5 = Unhappy; life satisfaction were: 1 = Satisfied, 2 = Rather satisfied, 3 = Average, 4 = Rather dissatisfied, 5 = Not satisfied; and life standard were: 1 = High, 2 = Middle-high, 3 = Middle-middle, 4 = Middle-

[1] Toshisuke Ozawa, approved user of the JPSC data, performed the statistical analysis.

low, 5 = Low. However, the scores were converted in the reverse order, such as: 1 = Unhappy, 2 = Rather unhappy, 3 = Average, 4 = Rather happy, 5 = Very happy; 1 = Not satisfied, 2 = Rather dissatisfied, 3 = Average, 4 = Rather satisfied, 5 = Satisfied; and 1 = Low, 2 = Middle-low, 3 = Middle-middle, 4 = Middle-high, 5 = High, respectively.

e. The values for life happenings were: 1 = Yes and 2 = No. The values were converted to dummy, such as 1 = Yes, 0 = Others. Therefore, unlike last year's results, any positive signs in happiness, life satisfaction and life standard indicate happier, more satisfied and higher, respectively. In the same way, some key ordinal values were converted to dummy values (i.e. the relationship with the baby born within a year, wives' and husbands' occupation, type of function, type of housing, and ownership of housing).
f. The changes in values were calculated between the previous year (y-1) and the concerned year (y).
g. The sample size was 2,352 (2 × 1,176) and this dataset was used for the analysis.

### 2.4. Analytical Approach

The tasks for this study were twofold: (1) cross sectional analysis of the JPSC data to identify major factors that are correlated with the score of happiness among life events, such as getting married, having a child, and social, economical, psychological, behavioural attributes; and (2) panel analysis of the JPSC data in order to estimate their happiness elasticities and consumption elasticities particular for those groups by classifying the sample into distinguished target groups by the life events and attributes identified in task (1).

#### 2.4.1. Cross Section Analysis: Linear regression analysis

Multi-linear regression analysis was performed to find out the variables both positively and negatively correlated with the scores of happiness on combined data. The variables used were cross section data – happiness being dependent variable and life events being independent variables. Therefore, the results only indicate the flat correlation between the score of happiness and either experienced the event or not. We tested 79 variables but instead of testing all at once, we divided the variables by relevant categories and tested by category.

#### 2.4.2. Panel Analysis: Comparison of mean values of the variables between those who experienced the life event (NY) and those who did not (NN)

We reported previously how we conducted statistical analyses on variables between adopters and non-adopters of new activities.[2][3] The details in the procedure are described elsewhere. [1][3][5] Briefly, the samples were divided into: Group NN (non-adopters) - those that have access to the new activity in neither year; Group NY (adopters) - those that started the new activity in concerned year (y) but not in the previous year (y-1); Group YY (continuous users) - those that have access to the new activity in both years; and Group YN (disposers) - those that had access in y-1 but not in y, where, "Y" and "N" denote for "Yes" and "No", reflecting whether they possess the good. We applied the same method for major life events and attributes. All the values of previous year (y-1) were subtracted from the concerned year (y) on individual bases. This process allowed us to yield the mean values of the "true differences" based on an individual base. Then the mean values of the dependent variables were compared between adopters and non-adopters. Matched-pair t-tests were performed on the mean values to check the significant difference at $p < 0.05$ between two target groups. It was expected that this analytical manner allows us to evaluate the genuine impact of the concerned life events and attributes on the shift of one's consumption patterns and happiness/life satisfaction.

## 3. Results

Results from the cross section analysis (linear regression analysis), happiness being dependent variables and life events being independent variables, are shown in Table 1. Double asterisks (**) indicate statistically different (S.D.) at $p < 0.05$ level. The variables with an asterisks (*) are those that have been chosen for panel analysis. The grey background indicates observations are not applicable.

Among the life events tested, burglary or theft, household stock possession, wife – employed and wife – housekeeper have large positive correlation (Beta > 0.1) with happiness, whereas lost good relationships with other family members, depression, household savings, living in a house, living in a dual house, living in reinforced-concrete apartment, living in wooden apartment, living an own house, renting a private apartment, renting public apartment and renting company/school owned housing have large negative correlation (Beta < -0.1). However, they are not necessarily significant.

Among the life events, significance were found with gave a birth (+), married and left family (+), divorced or separated (-), accident/disaster (-), credit card/loan-related trouble (-), income cut or depreciation of properties (+), lost good relationships with other family members (--), depression (--), annual income: husband (+), annual income: wife or self (-), wife – Employed (++), wife – unemployed (+), wife – housekeeper (++), husband - part-time position (-), and rent public apartment (--), where (+) and (-) represent positive and negative correlations, respectively, and (++) and (--) represent large positive and negative correlations (Beta > 0.1 or <-0.1). However they do not necessarily have large numbers of observations.

Among those life events and attributes, ten life events and attributes which may alter one's happiness were determined to be used as to divide the sample into homogeneous target sub-groups. During the process, we considered the results of linear regression analysis, frequencies for each variable, and whether they are active or passive events. It is important to consider number of observation because the sample will be stratified into groups of adopters and non-adopters of technologies in the further analysis for another section of this research. For this study we decided to choose only active life events for further analysis because normally, these passive events were not under ones' control and rarely intentions of these young women are behind these events.

Table 1. Results from the cross section analysis (linear regression analysis), happiness being dependent variables and life events being independent variables.

| Category | Number of Variables | Variables of events and attributes | Observation | Beta | t | Sig. Lev. | p<0.05 |
|---|---|---|---|---|---|---|---|
| Life changes in member of family members | 12 | Gave a birth (*) | 154 | 0.080 | 3.904 | 0.000 | ** |
| | | Took parent(s) along home | 13 | -0.018 | -0.873 | 0.383 | |
| | | Return of a family member | 6 | 0.004 | 0.194 | 0.847 | |
| | | Increase for other reason | 26 | -0.025 | -1.229 | 0.219 | |
| | | A family member transferred | 14 | 0.008 | 0.406 | 0.685 | |
| | | A family member moved out (*) | 40 | -0.022 | -1.063 | 0.288 | |
| | | Loss by death | 24 | 0.016 | 0.783 | 0.434 | |
| | | Loss for other reason | 26 | 0.001 | 0.069 | 0.945 | |
| | | Married and left family (*) | 57 | 0.087 | 4.235 | 0.000 | ** |
| | | Divorced or separated | 10 | -0.054 | -2.601 | 0.009 | ** |
| | | Left for an independent life | 29 | -0.004 | -0.213 | 0.831 | |
| | | Started to live with parents | 22 | 0.010 | 0.473 | 0.636 | |
| Happenings to self | 11 | Found a new job | 175 | -0.013 | -0.600 | 0.549 | |
| | | Changed job | 179 | -0.009 | -0.446 | 0.656 | |
| | | Quit job | 128 | 0.002 | 0.089 | 0.929 | |
| | | Enrolled to a (graduate or professional) school | 17 | -0.036 | -1.727 | 0.084 | |
| | | Started a new lesson/training (*) | 201 | 0.030 | 1.465 | 0.143 | |
| | | Took a leadership of a committee or organization (*) | 378 | 0.009 | 0.421 | 0.674 | |
| | | Illness requiring an operation or hospitalization | 41 | -0.005 | -0.262 | 0.793 | |
| | | Depression/other psychiatric symptoms | 31 | -0.010 | -0.479 | 0.632 | |
| | | Loan/credit card related trouble | 12 | -0.032 | -1.536 | 0.125 | |
| | | Accident/disaster | 66 | -0.055 | -2.680 | 0.007 | ** |
| | | Other | 105 | 0.003 | 0.150 | 0.881 | |
| Accidents, disasters, and consumer troubles | 4 | Traffic accidents | 48 | -0.062 | -0.280 | 0.781 | |
| | | Burglary or theft | 3 | 0.184 | 1.066 | 0.290 | |
| | | Bankruptcy | 7 | -0.074 | -0.470 | 0.640 | |
| | | Other | 9 | -0.101 | -0.640 | 0.524 | |
| Happenings involving family | 9 | Transferred | 70 | 0.005 | 0.221 | 0.825 | |
| | | Vol. retirement or lost job | 99 | -0.017 | -0.819 | 0.413 | |
| | | Business bankrupts | 11 | 0.006 | 0.309 | 0.757 | |
| | | Illness requiring hospitalization or operation | 107 | -0.023 | -1.135 | 0.256 | |
| | | Depression or other psychiatric problems | 23 | -0.023 | -1.102 | 0.271 | |
| | | Credit card/loan-related trouble | 19 | -0.062 | -2.918 | 0.004 | ** |
| | | Accident/disaster | 66 | -0.013 | -0.620 | 0.535 | |
| | | Entrance exam and enrollment (*) | 270 | 0.026 | 1.272 | 0.204 | |
| | | Others | 75 | -0.004 | -0.201 | 0.841 | |
| Life changes | 7 | Big expenditure | 167 | -0.042 | -1.081 | 0.280 | |
| | | Income cut or depreciation of properties | 88 | -0.087 | -2.203 | 0.028 | ** |
| | | Heavy burden on taking care | 58 | 0.009 | 0.229 | 0.819 | |
| | | Lost good relationships with other family members | 32 | -0.113 | -2.737 | 0.006 | ** |
| | | Depression | 98 | -0.136 | -3.234 | 0.001 | ** |
| | | Divorced or separated | 2 | | | | |
| | | Others | 26 | 0.021 | 0.550 | 0.582 | |
| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | 12 | Food | | -0.019 | -0.777 | 0.437 | |
| | | Housing (Rent/Mortgage) | | 0.029 | 1.366 | 0.172 | |
| | | Water, Gas, Electricity | | 0.022 | 0.904 | 0.366 | |
| | | Furniture and Household Appliances | | 0.017 | 0.792 | 0.429 | |
| | | Clothing and Shoes | | 0.016 | 0.737 | 0.461 | |
| | | Medical and Insurance | | -0.004 | -0.190 | 0.850 | |
| | | Transportation | | 0.016 | 0.787 | 0.431 | |
| | | Communication | | -0.032 | -1.510 | 0.131 | |
| | | Education | | 0.001 | 0.045 | 0.964 | |
| | | Hobby and Leisure | | 0.012 | 0.572 | 0.567 | |
| | | Going out | | 0.038 | 1.827 | 0.068 | |
| | | Allowances | | 0.022 | 0.967 | 0.334 | |
| Financial situation | 6 | Annual income: husband ( 10,000 yen) | | 0.096 | 3.623 | 0.000 | ** |
| | | Annual income: wife or self ( 10,000 yen) | | -0.057 | -2.170 | 0.030 | ** |
| | | Annual income: household business ( 10,000 yen) | | 0.037 | 1.384 | 0.166 | |
| | | Annual income: other family member ( 10,000 yen) | | -0.029 | -1.099 | 0.272 | |
| | | Household savings (10,000 yen) | | -0.135 | -1.781 | 0.076 | |
| | | Household stock possession (10,000 yen) | | 0.149 | 1.971 | 0.050 | |
| Employment Situation (Dummy) | 10 | Wife – Employed (*) | 1421 | 0.234 | 3.125 | 0.002 | ** |
| | | Wife - Unemployed | 18 | 0.092 | 3.803 | 0.000 | ** |
| | | Wife - Student | 10 | 0.033 | 1.437 | 0.151 | |
| | | Wife - Housekeeper | 860 | 0.342 | 4.583 | 0.000 | ** |
| | | Wife - Full-time position (*) | 649 | | | | |
| | | Wife - Part-time position | 535 | -0.026 | -0.909 | 0.364 | |
| | | Wife - Contractor | 61 | -0.038 | -1.323 | 0.186 | |
| | | Husband - Full-time position | 1432 | | | | |
| | | Husband - Part-time position | 14 | -0.058 | -2.206 | 0.028 | ** |
| | | Husband - Contractor | 13 | -0.002 | -0.061 | 0.952 | |
| Type of Housing (Dummy) | 4 | A House (*) | 1353 | -0.683 | -1.381 | 0.167 | |
| | | Dual house | 39 | -0.202 | -1.566 | 0.118 | |
| | | Reinforced-concrete apartment | 805 | -0.623 | -1.313 | 0.189 | |
| | | Wooden apartment | 154 | -0.329 | -1.326 | 0.185 | |
| Ownership of housing (Dummy) | 4 | Own house (*) | 1508 | -0.656 | -1.936 | 0.053 | |
| | | Rent private apartment | 447 | -0.508 | -1.828 | 0.068 | |
| | | Rent public apartment | 235 | -0.447 | -2.102 | 0.036 | ** |
| | | Company/school owned housing | 160 | -0.316 | -1.767 | 0.077 | |
| | 79 | | | | | | |

Table 2 shows the life events and attributes chosen to divide the sample into homogeneous sub-groups for further analysis and the observations per group based on experience of the events. The NN, NY, YY and YN stand for those who never experienced, those who experienced in the concerning year (y) but not previous year (y-1), those who experienced in both years and those who experienced in y-1 but not in y, respectively.

Married and left family, gave a birth to a child, wife – employed, started living in a detached single family house, and starting living in an own condominium or house were chosen because of the significance in the correlations. A family member moved out for business reason, started new lessons or learning, took a leadership of a committee, club or organization were chosen because they are active decision rather than passive happening without control. Wife - full-time position was chosen because of the large number for observations and would directly affect the status of women like valuable wife-employed. We must mention however that the software automatically excluded this particular variable in the process of linear regression analysis, indicating that some analytical requirements may not have been met. Finally, a family member had entrance exams and enrolled to a school was chosen because it was significantly correlated with the possession of cloth dryer, personal computer and mobile phone (see Figure 48 of Deliverable 5, D5). The total of the observations are 2,352 for all of the variables except for wife - full-time position because this item does not cover all the individuals in the sample.

Table 2. The life events and attributes chosen to divide the sample into homogeneous sub-groups for further analysis and the observations per group based on experience of each event.

| Variable | NN | NY | YY | YN | Total |
|---|---|---|---|---|---|
| (1) Married and left family | 2,231 | 57 | 0 | 64 | 2,352 |
| (2) Gave a birth to a child | 2,034 | 149 | 5 | 164 | 2,352 |
| (3) A family member moved out for business reason | 2,330 | 13 | 1 | 8 | 2,352 |
| (4) Started new lessons or learning | 1,967 | 64 | 137 | 184 | 2,352 |
| (5) Took a leadership of a committee, club or organization | 1,768 | 235 | 143 | 206 | 2,352 |
| (6) A family member had entrance exams and enrolled to a school | 1,877 | 235 | 35 | 205 | 2,352 |
| (7) Wife - employed | 772 | 170 | 1,251 | 159 | 2,352 |
| (8) Wife - Full-time position | 441 | 32 | 599 | 21 | 1,093 |
| (9) Started living in a detached single family house | 948 | 65 | 1,288 | 51 | 2,352 |
| (10) Starting living in an own condominium or house | 397 | 463 | 1,437 | 55 | 2,352 |

Using the ten life events, we conducted panel analysis to see the differences of mean values of happiness, life satisfaction, and consumption data between those who experienced the event (NY) and those who did not (NN) in the concerned year. The results are shown in Figures 1-4 and Tables A1 - A10 in Appendix A.

In terms of the indices for ultimate utility, getting married is significantly correlated with self-reported happiness, causing an increase by 0.24 points, and giving a birth to a child and moving to a detached single family house (not necessarily an own house) significantly correlate with the increase of self-reported living standard by 0.10 and 0.17 points, respectively. These signs of tendencies are in agreement with our hypothesis, although the increase of living standard for those who gave birth needs further discussion.

In terms of household expenditure and household possession of durable consumer goods, getting married and moving to a house are the most influential life events among the ten events tested for this study. It is interesting to note that getting married and giving birth to a baby are both significantly correlated with getting a video camera, where getting married causes an increase in average household possession by 0.21 video cameras, i.e., 21 % of the households purchased a (additional) video camera. Giving birth causes an increase by 0.11 video cameras per household. Moreover, starting living in a detached single family house is significantly correlated with getting an automatic dishwasher and cloth dryer, increasing by 0.15 and 0.08, respectively. It may be attributed to more space available than previous places. However, moving to an own condominium or house alters neither indices for ultimate utility nor major consumption patterns, except for purchase of automatic dishwasher and air conditioner (data not shown). It may be attributed to great economic pressure due to purchasing of a house.

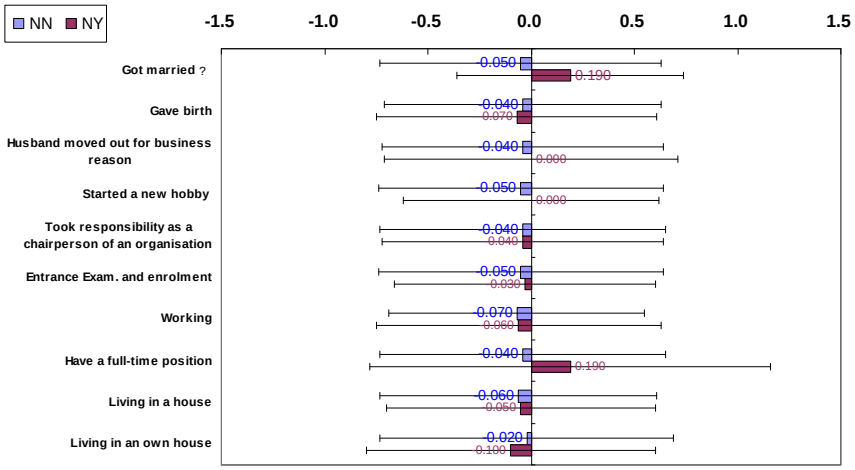
In terms of time-use patterns, getting married significantly correlates with decrease in wives' commercial working time by 209 minutes and commuting by 14 minutes and increase in house-keeping and taking care

of children by 228 minutes during the week. In the weekend and holidays, getting married significantly correlates with wives' decrease of commuting by 6 minutes and increase house-keeping and taking care of children by 145 minutes.

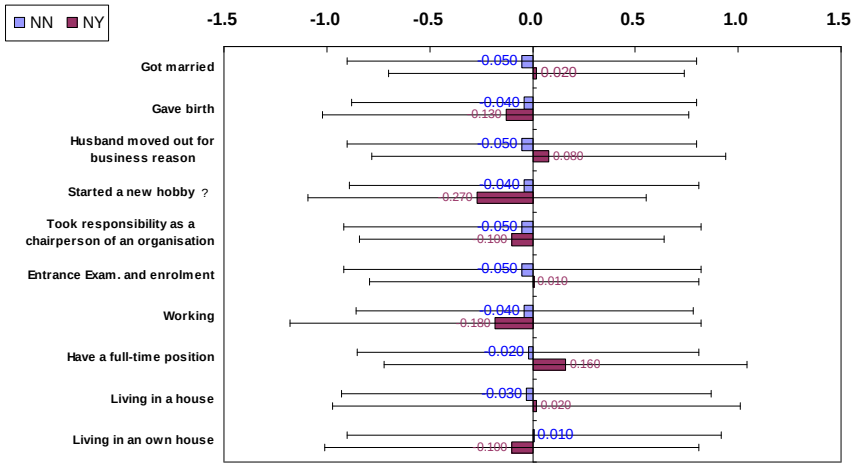
The impact of giving a birth to a child on altering the time-use pattern of wives and husbands is prominent. For example, it correlates with the decreases of basically all the wives' activities (commuting, working, hobby, leisure and going out, sleep, eat, personal hygiene) and with increase in house-keeping and taking care of children by 308 minutes. In the weekends and holidays, wives' time for hobby, leisure and going out decreases even more than during the weekdays and the additional time is allocated to house-keeping and taking care of children by 281 minutes. Though husbands are not as affected as wives, having a new baby significantly correlates with decrease in study, increase in house-keeping, and taking care of children in weekdays. In weekends and holidays, husbands' time decreases for hobby, leisure and going out by 48.9 minutes, and sleep, eat, personal hygiene decrease by 43 minutes.

.

1. Happiness




2. Life Satisfaction




3. Living Standard

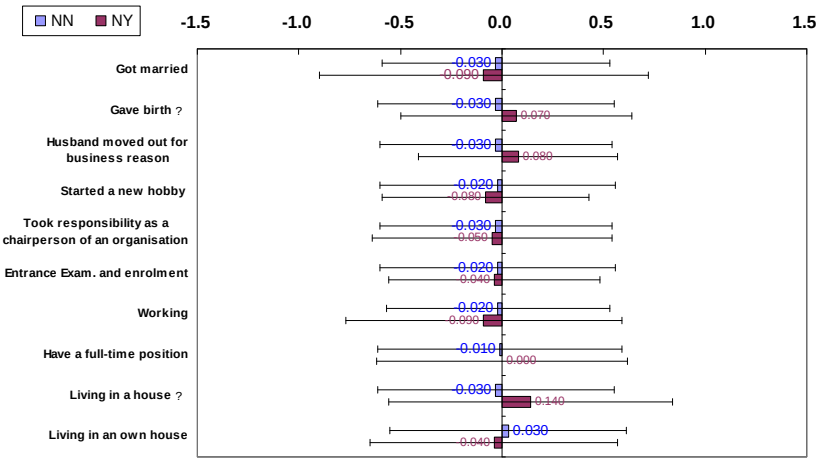
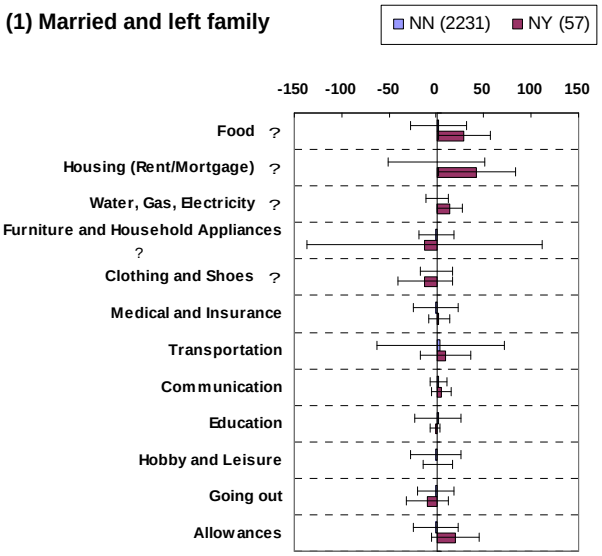
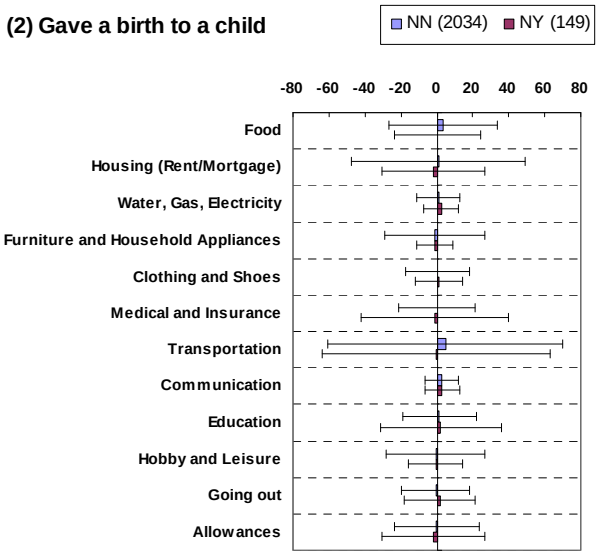



Figure 1. Results of the panel analysis for changes in self-reported ultimate utility indicators between those who experienced the events (NY) and those who did not (NN). Error bars represent standard deviation, and stars represent significantly difference at $p < 0.05$.

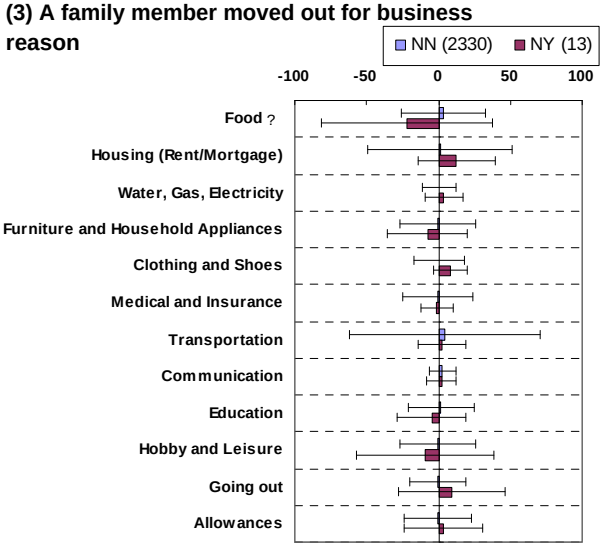
**(1) Married and left family**



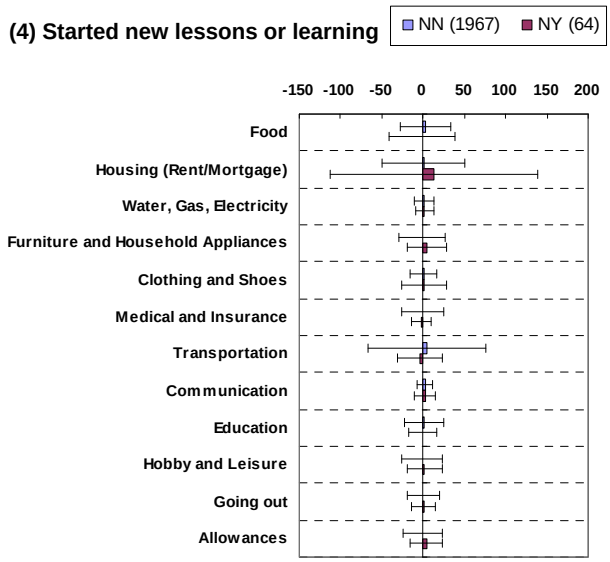

**(2) Gave a birth to a child**



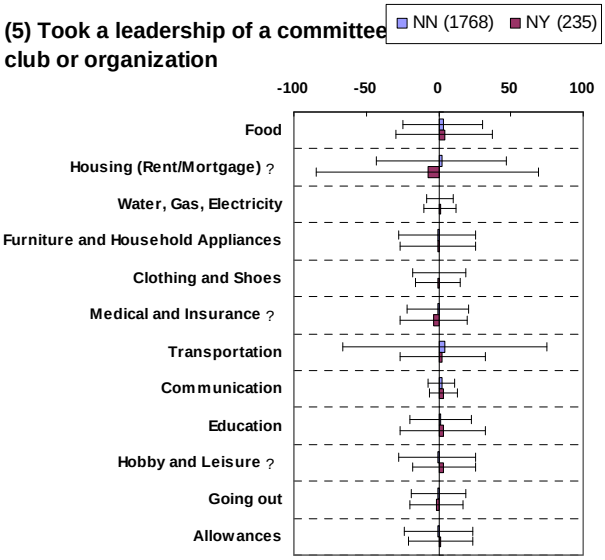

**(3) A family member moved out for business reason**



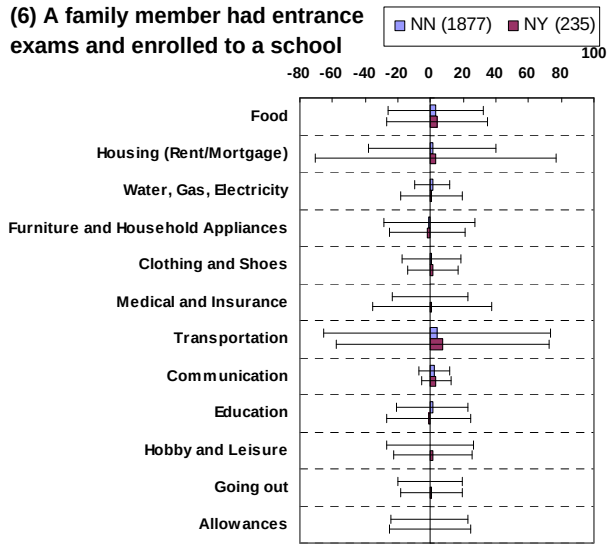

**(4) Started new lessons or learning**




**(5) Took a leadership of a committee club or organization**




**(6) A family member had entrance exams and enrolled to a school**



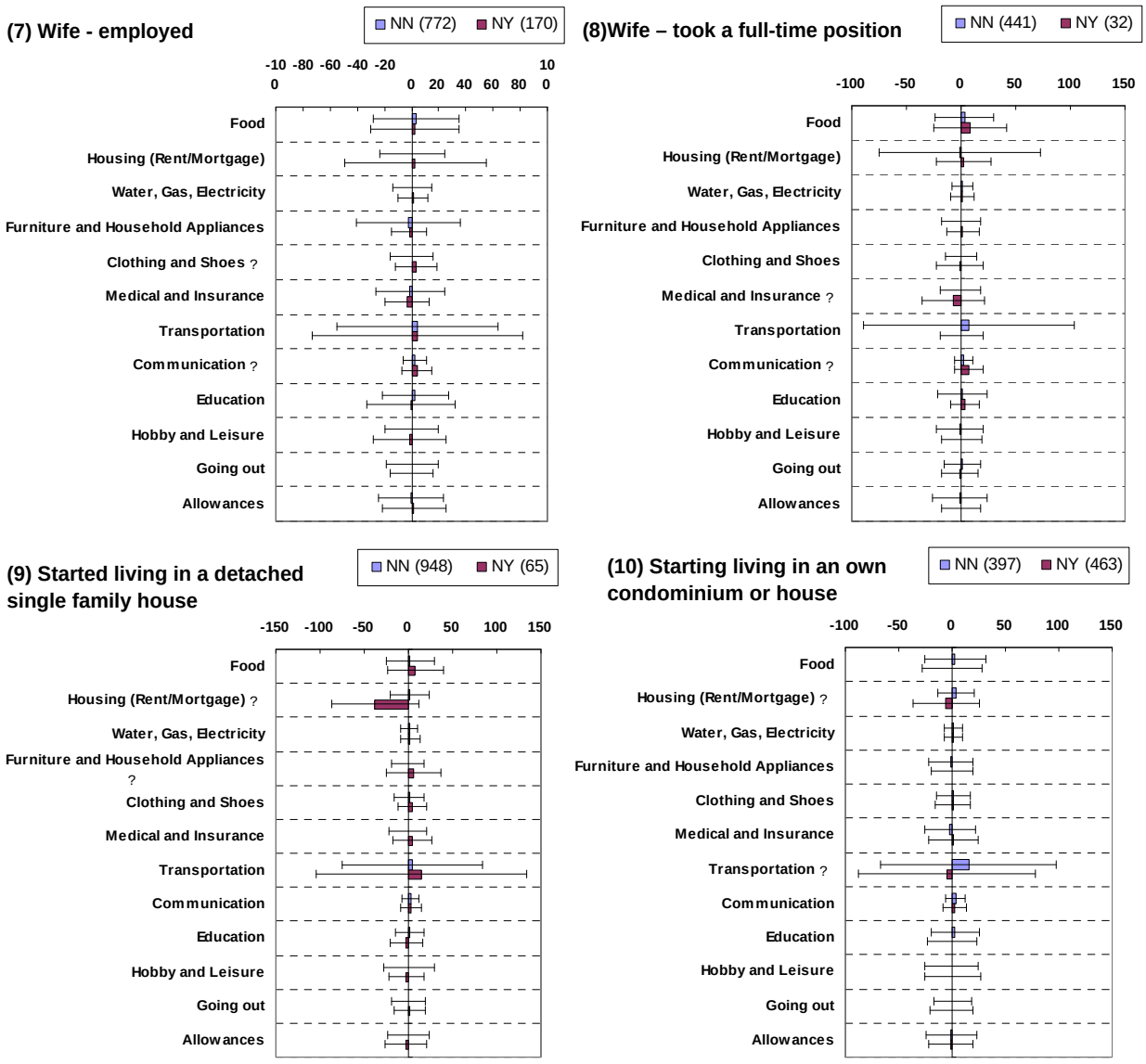
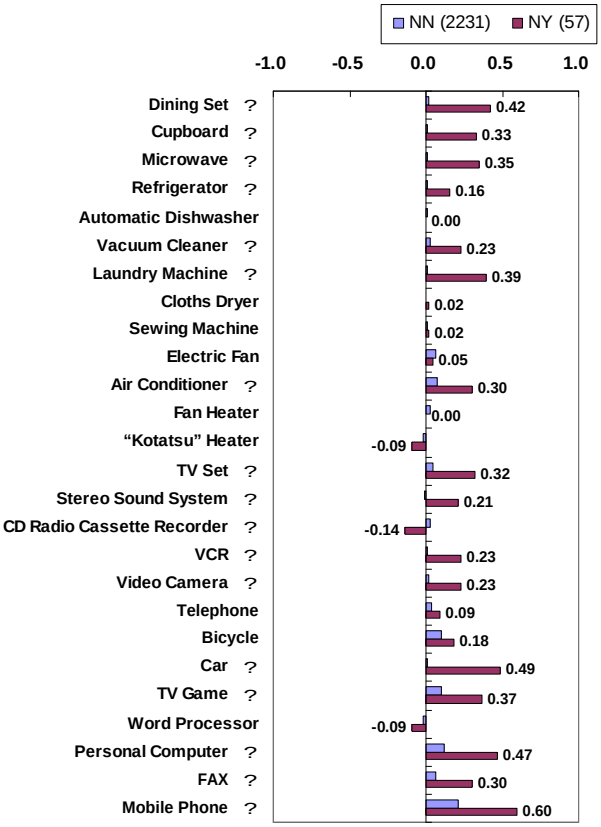
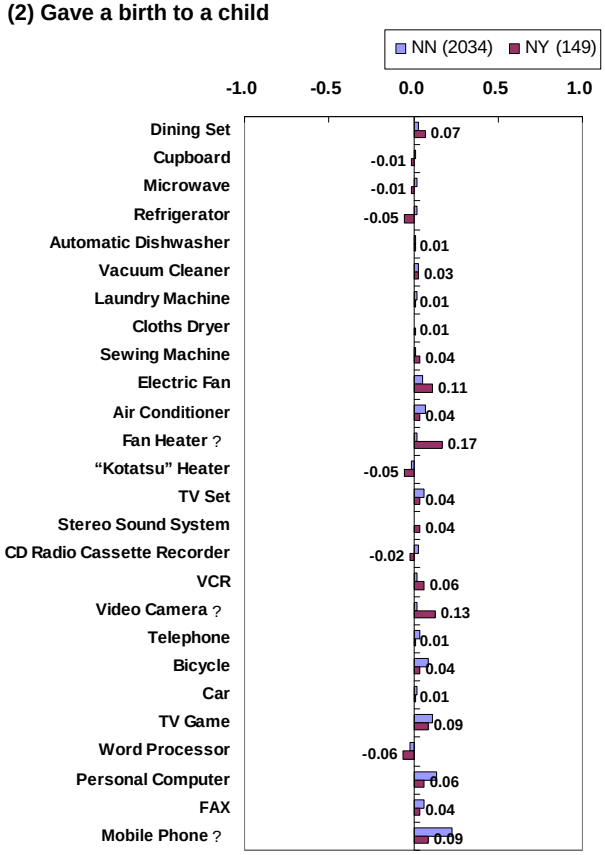



Figure 2. Results of the panel analysis for changes in household spending allocation for the month of September (1,000 Yen) between those who experienced the events (NY) and those who did not (NN). Error bars represent standard deviation, and stars represent significantly difference at $p < 0.05$.

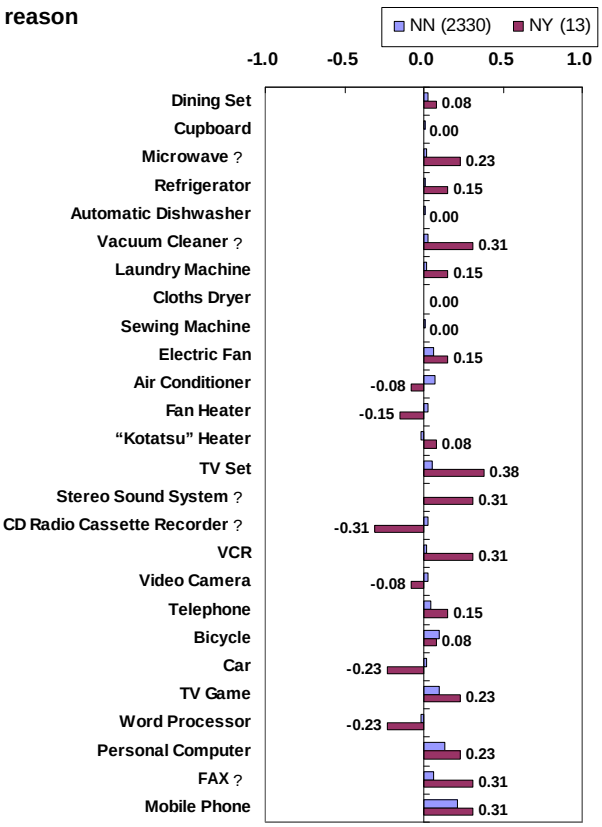
**(1) Married and left family**



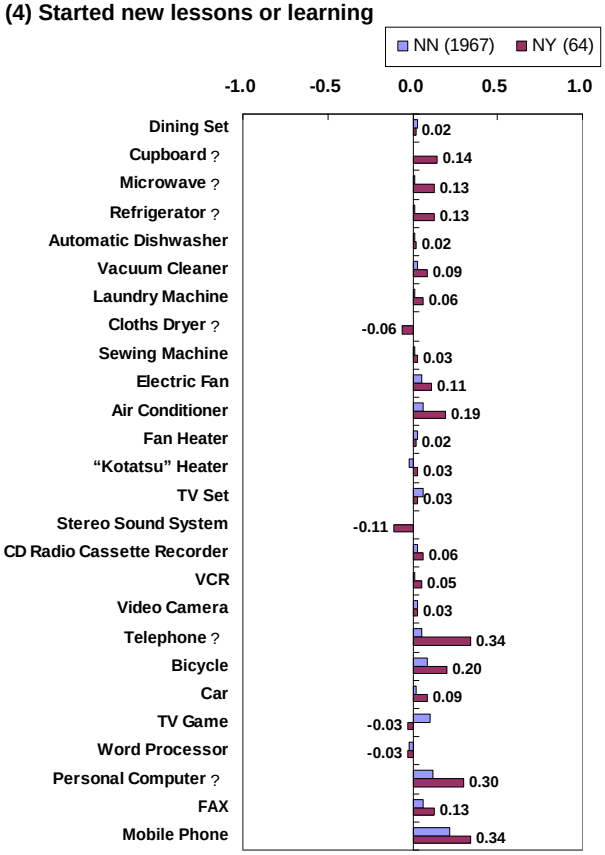

**(2) Gave a birth to a child**



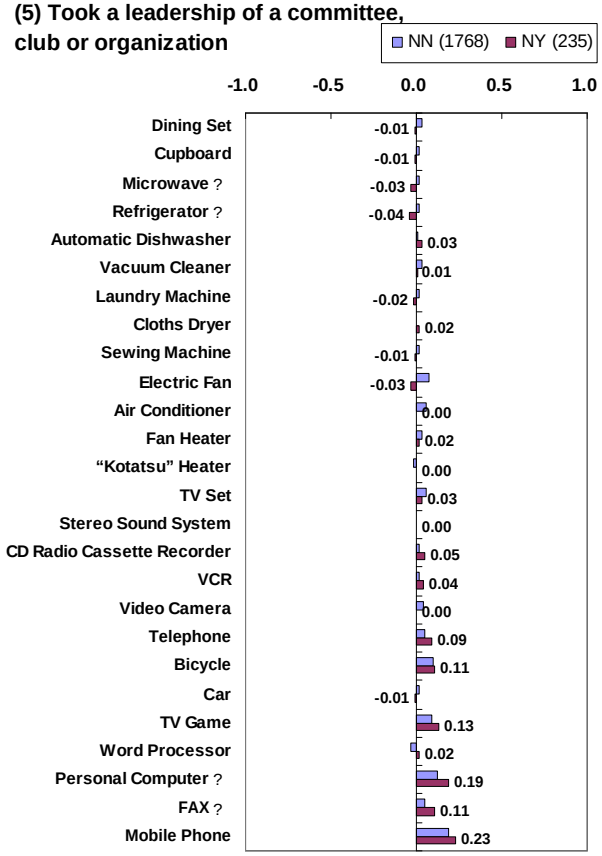

**(3) A family member moved out for business reason**



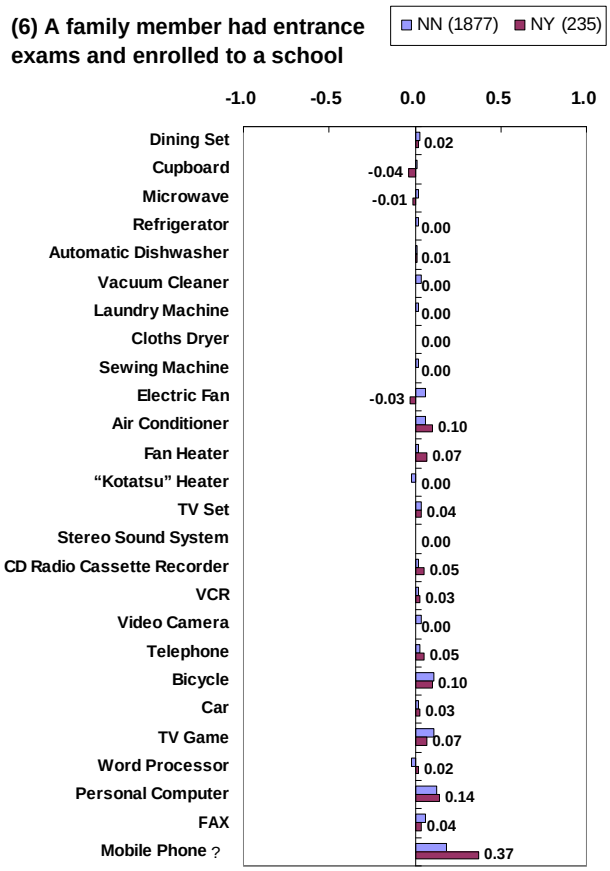

**(4) Started new lessons or learning**



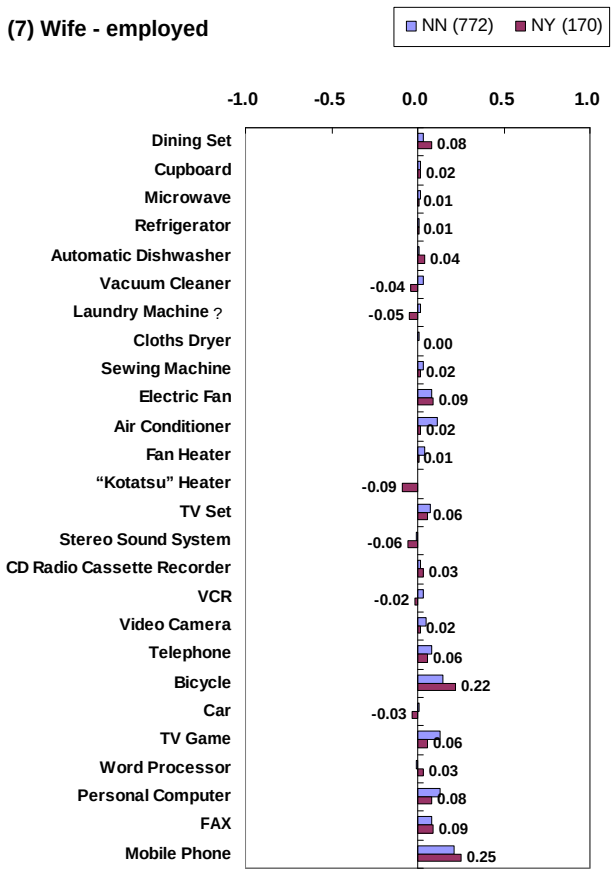
**(5) Took a leadership of a committee, club or organization**



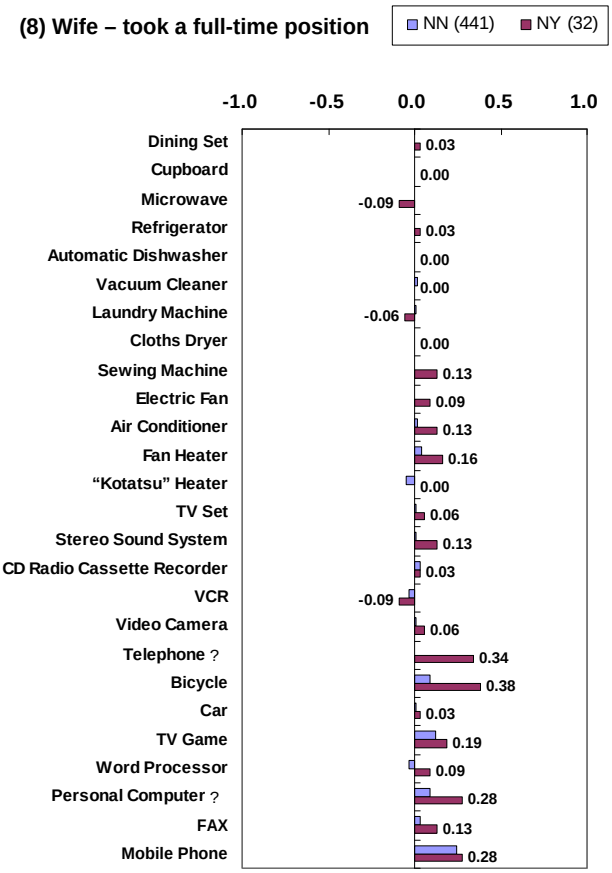

**(6) A family member had entrance exams and enrolled to a school**




**(7) Wife - employed**




**(8) Wife – took a full-time position**



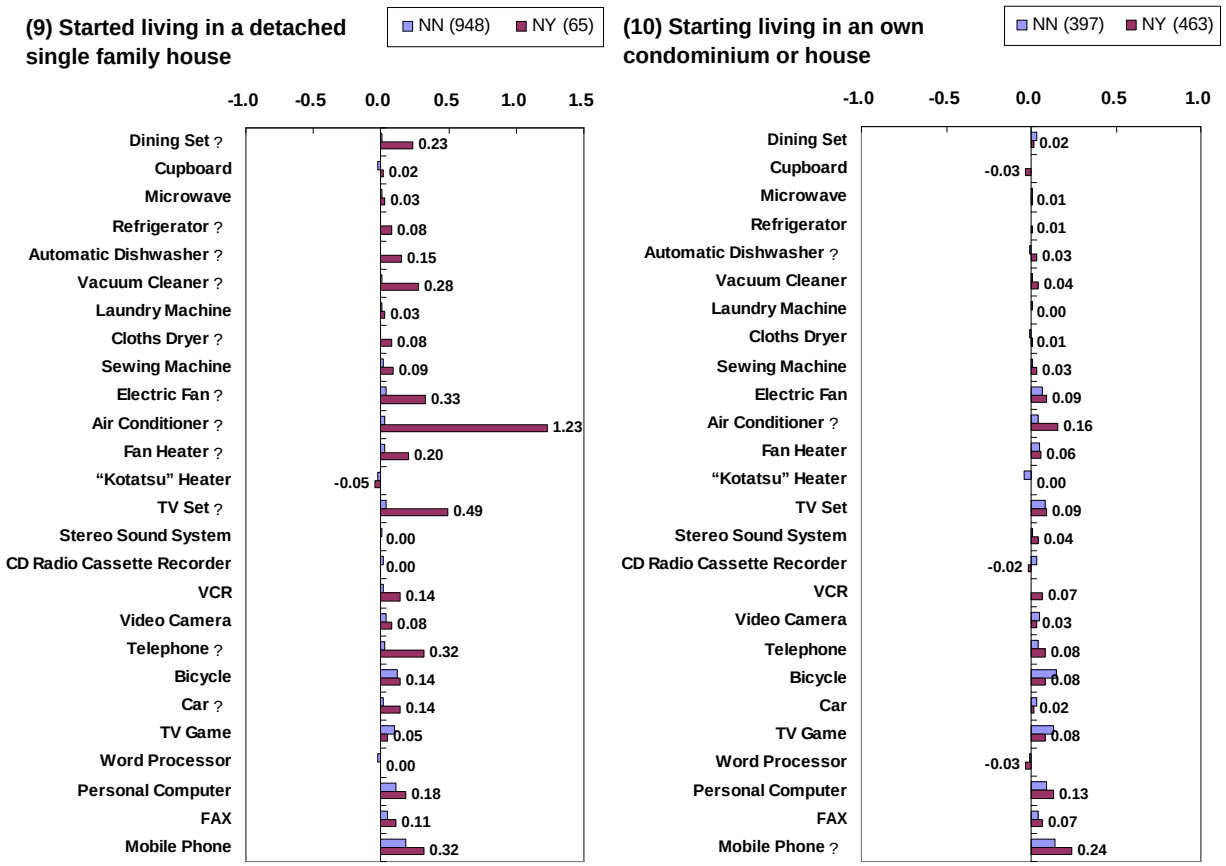
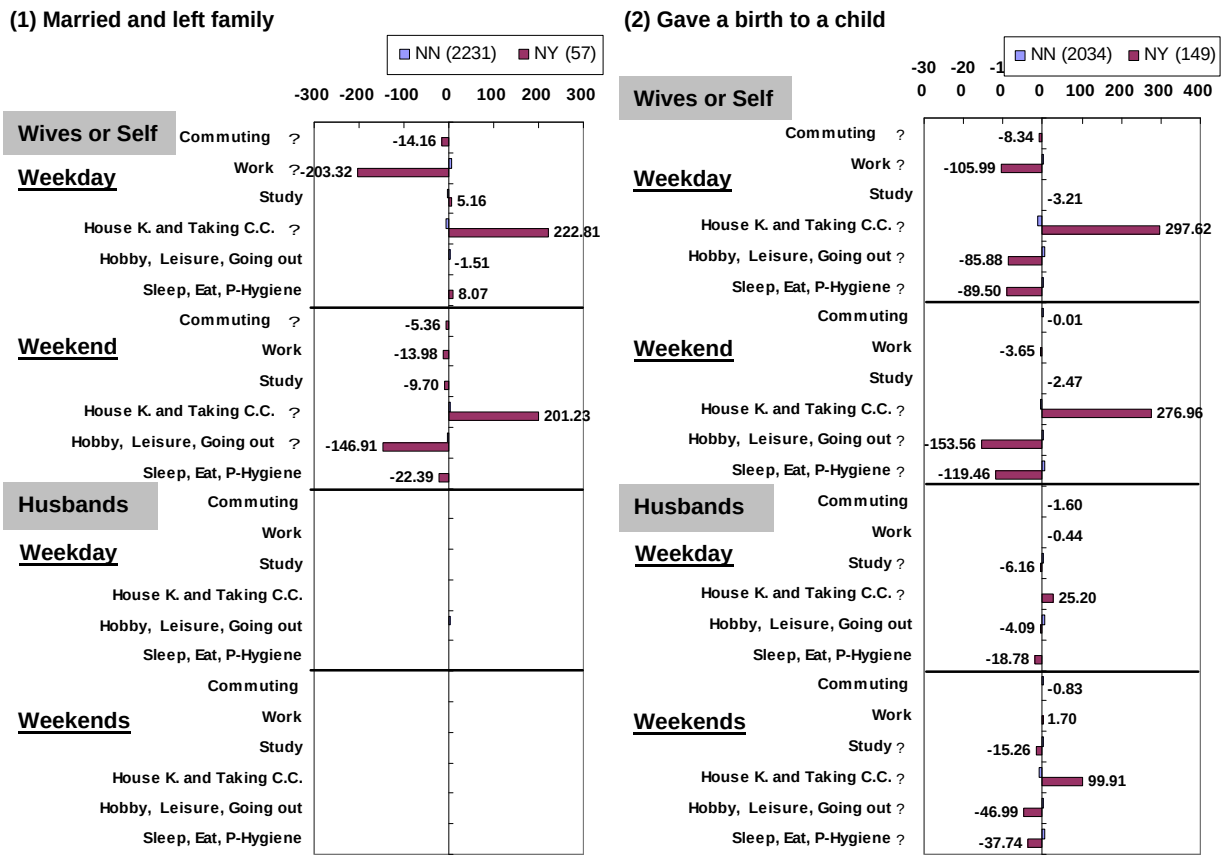
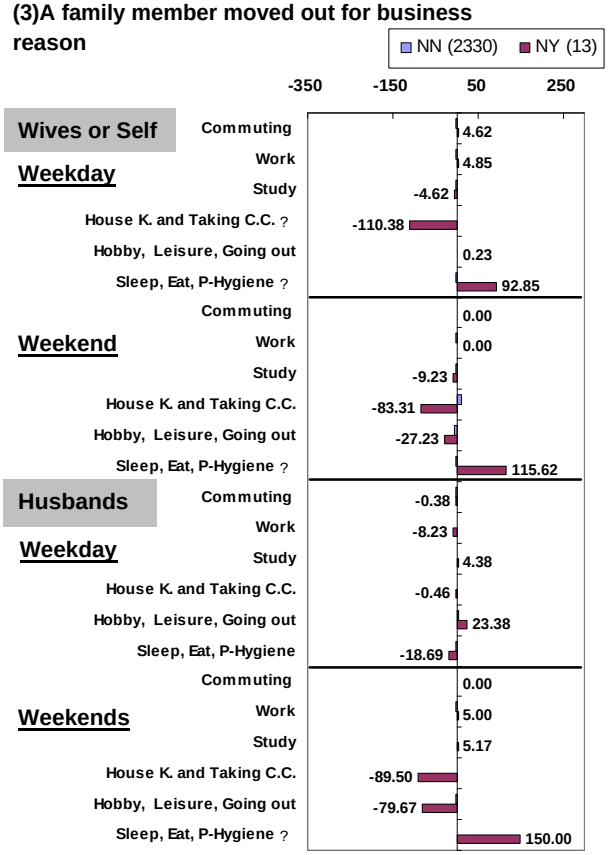


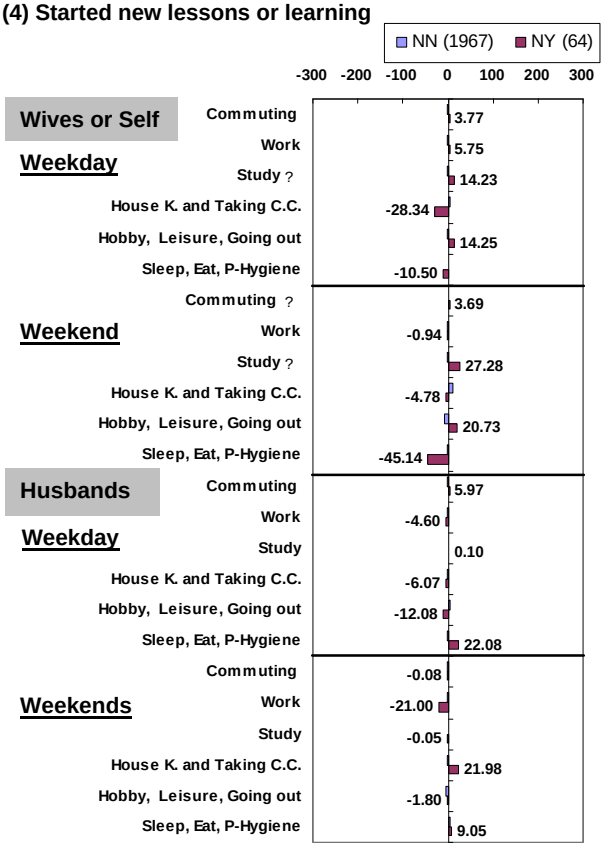

Figure 3. Results of the panel analysis for changes in household possession of durable consumer goods between those who experienced the events (NY) and those who did not (NN). Stars represent significantly difference at $p < 0.05$.



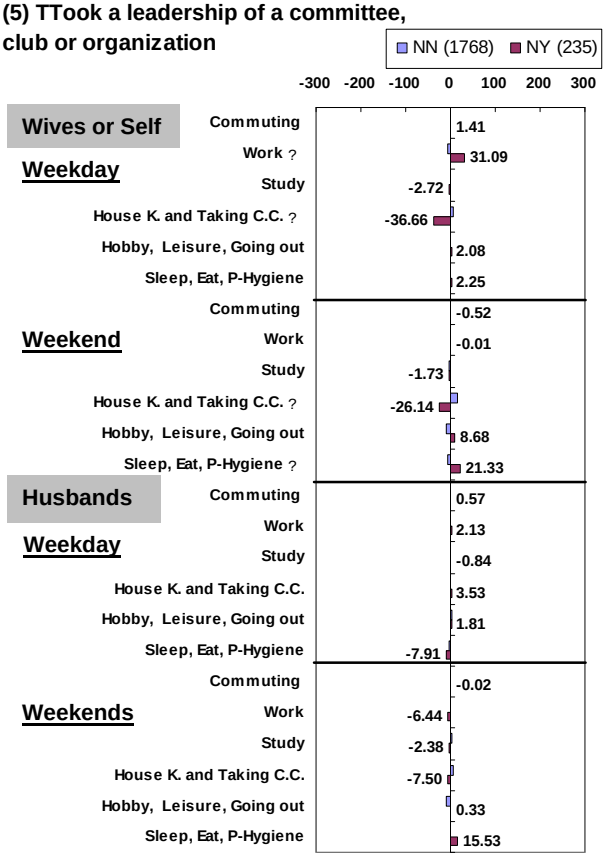
**(3)A family member moved out for business reason**



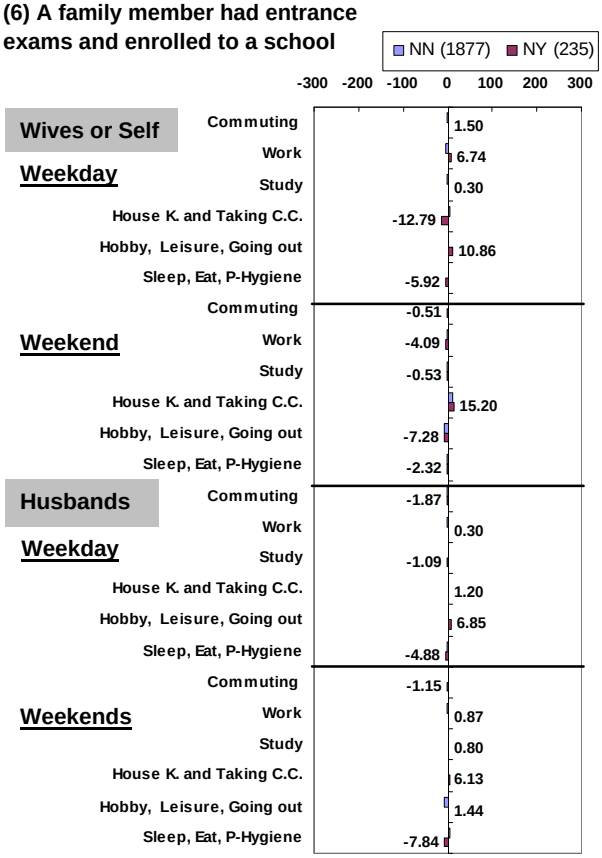

**(4) Started new lessons or learning**




**(5) TTook a leadership of a committee, club or organization**




**(6) A family member had entrance exams and enrolled to a school**



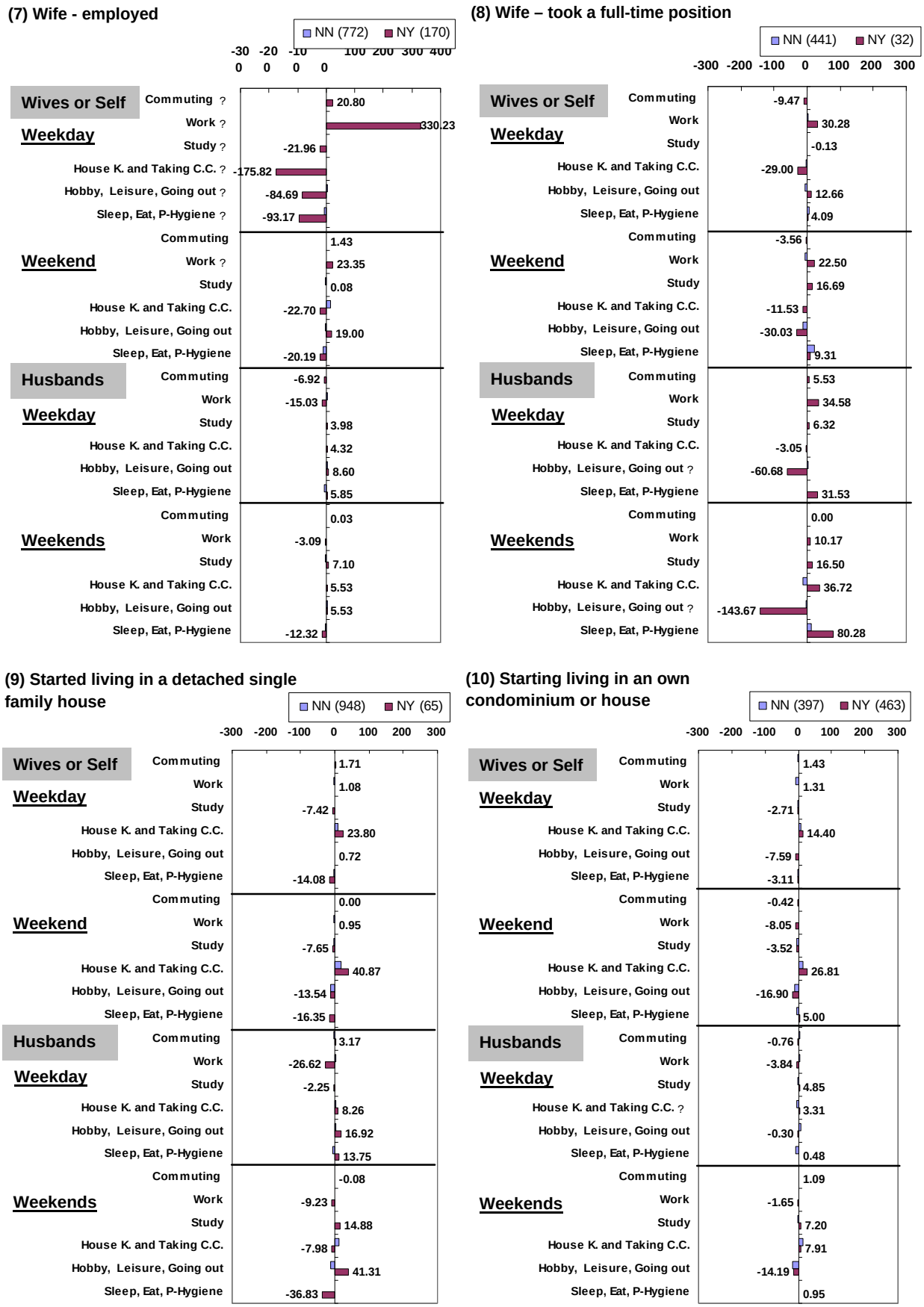



Figure 4. Results of the panel analysis for changes in time-use patterns (minutes) between those who experienced the events (NY) and those who did not (NN). Stars represent significantly difference at $p < 0.05$.

## 4. Discussions

Not all the ten variables for life events and attributes that were chosen for panel analysis were necessarily significantly correlated with the score of happiness, based on the results of the linear regression analysis. If the purpose of this working paper had sorely focused on identifying the correlations between the happiness scores and the independent variables, we could have identified the variables that had significant difference in mean values. However, the purpose of this working paper was to identify major factors that affect change of happiness, so that it could enable us to perform re-analysis of the JPSC data by forming more homogenous sub-groups in order to reduce the variance of consumption elasticities and enhancing the robustness of results. Therefore, the ten event variables were chosen based on the results of the linear regression analysis and other factors, such as number of observations, whether the events are active or passive. These ten event variables were then used for the panel analysis by stratifying the sample into those who experienced the affecting events (NY) and those who did not (NN), respectively. Among the ten events chosen, getting married was the only event which showed significant difference in happiness. The results from the panel analysis suggested a distinguished shift in young Japanese women's happiness could be observed for limited concerned target groups, and forming sub-groups by life events and attributes helps distinguish the characteristics of homogenous target groups for further analyses. However, we must say that the value (or score) of happiness has still large interpersonal variation and makes it difficult to form homogenous target groups.

There may be multiple causes for this difficulty of distinction. One possible cause is that one person experiences more than one life event in the same period of time and these events may be a mixture of positively and negatively correlated events to the change of happiness. For example, the results of linear regression analysis for giving birth to a child and getting married and left family are similar – Beta values are 0.080 and 0.087, respectively and significance level being 0.000. However, the results of the panel analysis differ from each other in the change of happiness – significance was found only for getting married and left home. It may be explained by the possibility that those individuals who gave birth may have had other major life events which may negatively affect happiness, such as losing good relationships with other family members or being depressed, etc. Acquisition of the method which does panel analysis considering the effects of all the life event variables is desirable for our study. Even though our method is not equipped to do such sophisticated analyses, it is transparent and still gives important insights.

We will discuss one of the major insights from this deliverable that is necessary for the next step of the on-going research project. For re-analysis of the JPSC data by forming more homogenous sub-groups in order to reduce the variance of happiness and enhancing the robustness of results (analytical procedure for D5), one may need to use multiple-stratification with several major life events. This method may lead to the problem that one may end up with low case numbers. However, this method will be a transparent way to single out events that may disturb the analysis and is optimal to understand what goes on. We will adopt this stratification method to the panel analysis for D5.

In addition to the analysis to identify major factors that affect change of happiness, we analysed the effects of these major factors on young Japanese women's consumption patterns. The results from the panel analysis of the JPSC data by forming homogenous sub-groups by life events and attributes clearly indicated distinguished shifts of young Japanese women's consumption elasticities particular for concerned target groups. Major life events, such as getting married, giving birth to a child, or start working, which alter the persons social status, have major contributions to time-consumption patterns, and getting married and moving to a house, which alter physical place of living, have major impacts on possession of durable goods and expenditure. Readiness of distinctions on consumption patterns by dividing the sample into target groups by life events were observed unlike that of self-reported subjective utilities, such as happiness. It indicates that although considerable heterogeneity in terms of life stages, major life happenings, income and level and type of consumption have been found in the whole sample, the number of significant changes in consumption activities attributable to defined subgroups remains large. Further discussion will be necessary on the reasons for the differences in responses to life events between physical and objective consumption patterns and self-reported subjective well being.

## 5. Conclusions

In order to identify major factors that affect change of happiness, we first looked into the correlations between happiness with life events and attributes of young Japanese women using multi-linear regression analysis. We chose ten affecting events based on the results of linear regression and other factors, such as number of observations. Then, we performed panel analyses by stratifying the sample into those who experienced the affecting events and those who did not, respectively. Among the ten events chosen, getting married was the only event which showed statistically significant difference in happiness. One possible cause for the difficulty of distinction could be that the individuals experience multiple life events that is a mixture of positively and negatively correlated events to the change of happiness. The results from the panel analysis suggested a distinguished shift in young Japanese women's happiness for limited concerned target groups do exist and forming sub-groups by life events and attributes helps distinguish the characteristics of homogenous target groups for further analyses to certain extent.

The results from the panel analysis of the JPSC data by forming homogenous sub-groups by life events and attributes clearly indicated distinguished shifts of young Japanese women's consumption elasticities particular for concerned target groups. Major life events, such as getting married, giving birth to a child, start working, which alters the person's social status, have major contributions to time-consumption patterns. Getting married and moving to a house, which alter physical place of living, have major impacts on possession of durable goods and expenditure. Although considerable heterogeneity in terms of life stages, major life happenings, income and level and type of consumption have been found, the number of significant changes in consumption activities attributable to defined subgroups remains large. This suggests that dividing the data samples according to attributes may be necessary to minimize the variances of the calculated elasticities, which in turn, estimates the accurate amount of $CO_2$ emissions.

In order to increase the resolution and robustness of this evaluation method, further study is necessary by conducting the same type of analysis using more detailed longitudinal data. Once such a methodology has been established, it will be made possible to evaluate the impacts of "sustainable consumption" activities on consumption patterns considering the interdependencies of consumption activities.

## 6. Acknowledgements

This paper is based on results of the project "CHap: $CO_2$-emissions per unit of happiness: a new indicator for sustainable consumption that considers and minimizes rebound effects" which is part of the program "Life Cycle approaches for Sustainable Consumption", launched by SNTT, sponsored by METI, and proposed by Dr. A. Inaba, AIST. We would like to thank these organizations and Dr. Inaba for their support.

## 7. References

[1] Hofstetter P. & Madjar M. (2003). Linking change in happiness, time-use, sustainable consumption, and environmental impacts: An attempt to understand time-rebound effects. Final report to the Society for Non-Traditional Technology, Japan/ BAO & Consultrix, Zürich.

[2] Hofstetter P. and T. Ozawa. (2003). Minimizing $CO_2$-emissions per unit of happiness. The Second International Workshop on Sustainable Consumption. Tokyo, Japan, December 12-13, 2003.

[3] T. Ozawa and Hofstetter P. (2004). Use of Longitudinal Panel Data to Estimate the Effects of Adopting New Activities to Household Consumption Patterns and Happiness. The Third International Workshop on Sustainable Consumption. Leeds, UK. March 5-6, 2004.

[4] Irokawa, Takuo. (1999). Panel Analysis of Life Substance and 'Life Satisfaction'. *Journal of Research on Household Economics.* 43: 50-58.

[5] Gershuny J. (2002). Web-use and Net-nerds: A Neo-Functionalist Analysis of the Impact of Information Technology in the Home. ISER Working Paper 2002-1. Colchester: University of Essex.

## Appendix A. The results of the panel analysis for ten life events.

Table A-1. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Married and left family

| Indicators for ultimate utility | NN (2231) | | NY (57) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.050 | 0.680 | 0.190 | 0.550 | ** |
| Life Satisfaction | -0.050 | 0.850 | 0.020 | 0.720 | |
| Living Standard | -0.030 | 0.560 | -0.090 | 0.810 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (2231) | | NY (57) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 2.60 | 29.23 | 29.44 | 26.73 | ** |
| Housing (Rent/Mortgage) | 0.24 | 50.62 | 42.75 | 40.03 | ** |
| Water, Gas, Electricity | 0.56 | 11.45 | 14.14 | 13.35 | ** |
| Furniture and Household Appliances | -0.50 | 18.33 | -12.28 | 124.10 | ** |
| Clothing and Shoes | 0.71 | 16.99 | -11.95 | 28.86 | ** |
| Medical and Insurance | -0.20 | 23.74 | 2.91 | 10.60 | |
| Transportation | 4.28 | 67.30 | 9.39 | 26.34 | |
| Communication | 2.46 | 9.09 | 4.79 | 10.17 | |
| Education | 1.52 | 23.69 | -1.32 | 5.50 | |
| Hobby and Leisure | -0.57 | 26.61 | 0.95 | 15.33 | |
| Going out | -0.23 | 19.08 | -9.67 | 22.75 | ** |
| Allowances | -0.98 | 23.34 | 20.16 | 24.64 | ** |

| Household possession of durable consumer good | NN (2231) | | NY (57) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | P<0.05 |
| Dining Set | 0.02 | 0.38 | 0.42 | 0.63 | ** |
| Cupboard | 0.01 | 0.51 | 0.33 | 0.69 | ** |
| Microwave | 0.01 | 0.29 | 0.35 | 0.52 | ** |
| Refrigerator | 0.01 | 0.39 | 0.16 | 1.07 | ** |
| Automatic Dishwasher | 0.01 | 0.21 | 0.00 | 0.27 | |
| Vacuum Cleaner | 0.03 | 0.50 | 0.23 | 0.71 | ** |
| Laundry Machine | 0.01 | 0.31 | 0.39 | 0.53 | ** |
| Cloths Dryer | 0.00 | 0.22 | 0.02 | 0.30 | |
| Sewing Machine | 0.01 | 0.35 | 0.02 | 0.48 | |
| Electric Fan | 0.06 | 0.71 | 0.05 | 0.81 | |
| Air Conditioner | 0.07 | 0.79 | 0.30 | 1.05 | ** |
| Fan Heater | 0.03 | 0.65 | 0.00 | 0.93 | |
| “Kotatsu” Heater | -0.02 | 0.52 | -0.09 | 0.69 | |
| TV Set | 0.05 | 0.73 | 0.32 | 0.98 | ** |
| Stereo Sound System | -0.01 | 0.51 | 0.21 | 0.65 | ** |
| CD Radio Cassette Recorder | 0.03 | 0.51 | -0.14 | 0.64 | ** |
| VCR | 0.01 | 0.64 | 0.23 | 0.78 | ** |
| Video Camera | 0.02 | 0.31 | 0.23 | 0.42 | ** |
| Telephone | 0.04 | 0.86 | 0.09 | 1.17 | |
| Bicycle | 0.10 | 0.87 | 0.18 | 0.95 | |
| Car | 0.01 | 0.48 | 0.49 | 0.91 | ** |
| TV Game | 0.10 | 0.69 | 0.37 | 0.77 | ** |
| Word Processor | -0.02 | 0.40 | -0.09 | 0.54 | |
| Personal Computer | 0.12 | 0.49 | 0.47 | 0.63 | ** |
| FAX | 0.06 | 0.35 | 0.30 | 0.60 | ** |
| Mobile Phone | 0.21 | 0.65 | 0.60 | 0.70 | ** |

| | Time-use patterns (minutes) | NN (2231) | | NY (57) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | 0.04 | 29.29 | -14.16 | 42.20 | ** |
| | Work | 5.44 | 150.90 | -203.32 | 277.74 | ** |
| | Study | -1.66 | 51.40 | 5.16 | 54.78 | |
| | House K. and Taking C.C. | -5.60 | 175.54 | 222.81 | 253.83 | ** |
| | Hobby, Leisure, Going out | 1.88 | 132.17 | -1.51 | 192.39 | |
| | Sleep, Eat, P-Hygiene | -0.35 | 164.72 | 8.07 | 200.65 | |
| Wife Weekends/Holidays | Commuting | 0.45 | 14.80 | -5.36 | 23.66 | ** |
| | Work | -0.94 | 71.84 | -13.98 | 81.21 | |
| | Study | -1.48 | 53.12 | -9.70 | 58.08 | |
| | House K. and Taking C.C. | 2.79 | 185.94 | 201.23 | 228.88 | ** |
| | Hobby, Leisure, Going out | -1.77 | 194.49 | -146.91 | 236.56 | ** |
| | Sleep, Eat, P-Hygiene | 0.61 | 192.22 | -22.39 | 300.03 | |
| Husband, Working Days | Commuting | -1.15 | 47.79 | N/A | N/A | N/A |
| | Work | -0.10 | 125.18 | N/A | N/A | N/A |
| | Study | 0.84 | 34.51 | N/A | N/A | N/A |
| | House K. and Taking C.C. | -0.45 | 70.15 | N/A | N/A | N/A |
| | Hobby, Leisure, Going out | 3.54 | 110.52 | N/A | N/A | N/A |
| | Sleep, Eat, P-Hygiene | -1.43 | 125.84 | N/A | N/A | N/A |
| Husband, Weekends/Holidays | Commuting | 0.12 | 12.41 | N/A | N/A | N/A |
| | Work | -0.53 | 84.37 | N/A | N/A | N/A |
| | Study | 0.68 | 62.65 | N/A | N/A | N/A |
| | House K. and Taking C.C. | -1.02 | 168.13 | N/A | N/A | N/A |
| | Hobby, Leisure, Going out | -0.28 | 238.73 | N/A | N/A | N/A |
| | Sleep, Eat, P-Hygiene | 1.27 | 232.30 | N/A | N/A | N/A |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-2. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Gave birth to a child

| Indicators for ultimate utility | NN (2034) | | NY (149) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | P<0.05 |
| Happiness | -0.040 | 0.670 | -0.070 | 0.680 | |
| Life Satisfaction | -0.040 | 0.840 | -0.130 | 0.890 | |
| Living Standard | -0.030 | 0.580 | 0.070 | 0.570 | ** |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (2034) | | NY (149) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.24 | 30.03 | 0.28 | 23.86 | |
| Housing (Rent/Mortgage) | 0.89 | 48.36 | -1.76 | 28.53 | |
| Water, Gas, Electricity | 0.85 | 11.85 | 2.56 | 9.56 | |
| Furniture and Household Appliances | -0.92 | 27.71 | -1.34 | 10.20 | |
| Clothing and Shoes | 0.15 | 17.90 | 1.26 | 13.30 | |
| Medical and Insurance | 0.01 | 21.62 | -1.11 | 40.82 | |
| Transportation | 4.87 | 65.16 | -0.52 | 63.26 | |
| Communication | 2.56 | 9.26 | 3.01 | 9.55 | |
| Education | 1.37 | 20.47 | 2.31 | 33.45 | |
| Hobby and Leisure | -0.63 | 27.42 | -0.72 | 15.25 | |
| Going out | -0.60 | 19.00 | 1.79 | 19.60 | |
| Allowances | -0.20 | 23.41 | -1.95 | 28.39 | |

| Household possession of durable consumer good | NN (2034) | | NY (149) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.40 | 0.07 | 0.37 | |
| Cupboard | 0.01 | 0.52 | -0.01 | 0.39 | |
| Microwave | 0.02 | 0.31 | -0.01 | 0.23 | |
| Refrigerator | 0.02 | 0.41 | -0.05 | 0.57 | |
| Automatic Dishwasher | 0.01 | 0.20 | 0.01 | 0.20 | |
| Vacuum Cleaner | 0.03 | 0.52 | 0.03 | 0.38 | |
| Laundry Machine | 0.02 | 0.33 | 0.01 | 0.27 | |
| Cloths Dryer | 0.00 | 0.23 | 0.01 | 0.16 | |
| Sewing Machine | 0.01 | 0.36 | 0.04 | 0.38 | |
| Electric Fan | 0.05 | 0.73 | 0.11 | 0.44 | |
| Air Conditioner | 0.07 | 0.80 | 0.04 | 0.64 | |
| Fan Heater | 0.02 | 0.66 | 0.17 | 0.53 | ** |
| “Kotatsu” Heater | -0.01 | 0.51 | -0.05 | 0.59 | |
| TV Set | 0.06 | 0.75 | 0.04 | 0.52 | |
| Stereo Sound System | 0.00 | 0.52 | 0.04 | 0.45 | |
| CD Radio Cassette Recorder | 0.03 | 0.52 | -0.02 | 0.51 | |
| VCR | 0.02 | 0.65 | 0.06 | 0.55 | |
| Video Camera | 0.02 | 0.31 | 0.13 | 0.40 | ** |
| Telephone | 0.04 | 0.88 | 0.01 | 0.84 | |
| Bicycle | 0.09 | 0.88 | 0.04 | 0.69 | |
| Car | 0.02 | 0.50 | 0.01 | 0.43 | |
| TV Game | 0.11 | 0.67 | 0.09 | 0.77 | |
| Word Processor | -0.02 | 0.41 | -0.06 | 0.39 | |
| Personal Computer | 0.14 | 0.50 | 0.06 | 0.42 | |
| FAX | 0.06 | 0.36 | 0.04 | 0.35 | |
| Mobile Phone | 0.23 | 0.66 | 0.09 | 0.52 | ** |

| | Time-use patterns (minutes) | NN (2034) | | NY (149) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.10 | 30.84 | -8.34 | 31.86 | ** |
| | Work | 2.45 | 154.05 | -105.99 | 222.16 | ** |
| | Study | -1.71 | 53.10 | -3.21 | 25.77 | |
| | House K. and Taking C.C. | -10.60 | 148.58 | 297.62 | 282.88 | ** |
| | Hobby, Leisure, Going out | 6.51 | 134.60 | -85.88 | 167.90 | ** |
| | Sleep, Eat, P-Hygiene | 3.63 | 164.72 | -89.50 | 186.68 | ** |
| Wife Weekends/Holidays | Commuting | 0.34 | 16.03 | -0.01 | 0.16 | |
| | Work | -1.40 | 74.91 | -3.65 | 39.11 | |
| | Study | -1.89 | 56.47 | -2.47 | 22.00 | |
| | House K. and Taking C.C. | -3.61 | 164.81 | 276.96 | 284.55 | ** |
| | Hobby, Leisure, Going out | 1.10 | 194.40 | -153.56 | 216.01 | ** |
| | Sleep, Eat, P-Hygiene | 5.49 | 194.11 | -119.46 | 203.54 | ** |
| Husband, Working Days | Commuting | -1.50 | 48.67 | -1.60 | 38.79 | |
| | Work | -1.54 | 125.74 | -0.44 | 110.23 | |
| | Study | 1.92 | 33.33 | -6.16 | 34.94 | ** |
| | House K. and Taking C.C. | -1.04 | 67.96 | 25.20 | 85.16 | ** |
| | Hobby, Leisure, Going out | 4.48 | 111.44 | -4.09 | 113.01 | |
| | Sleep, Eat, P-Hygiene | -0.82 | 123.36 | -18.78 | 146.26 | |
| Husband, Weekends/Holidays | Commuting | 0.26 | 9.00 | -0.83 | 31.09 | |
| | Work | -1.55 | 84.54 | 1.70 | 91.97 | |
| | Study | 2.92 | 57.39 | -15.26 | 115.33 | ** |
| | House K. and Taking C.C. | -8.24 | 151.22 | 99.91 | 231.20 | ** |
| | Hobby, Leisure, Going out | 1.89 | 229.04 | -46.99 | 286.43 | ** |
| | Sleep, Eat, P-Hygiene | 4.92 | 229.27 | -37.74 | 261.41 | ** |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-3. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - A family member moved out for business reason

| Indicators for ultimate utility | NN (2330) | | NY (13) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.040 | 0.680 | 0.000 | 0.710 | |
| Life Satisfaction | -0.050 | 0.850 | 0.080 | 0.860 | |
| Living Standard | -0.030 | 0.570 | 0.080 | 0.490 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (2330) | | NY (13) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.33 | 29.09 | -22.00 | 59.19 | ** |
| Housing (Rent/Mortgage) | 1.15 | 50.40 | 12.46 | 26.98 | |
| Water, Gas, Electricity | 0.90 | 11.65 | 3.69 | 13.21 | |
| Furniture and Household Appliances | -0.81 | 26.37 | -7.77 | 27.82 | |
| Clothing and Shoes | 0.37 | 17.52 | 7.92 | 11.65 | |
| Medical and Insurance | -0.29 | 24.35 | -1.08 | 11.30 | |
| Transportation | 4.32 | 66.04 | 2.69 | 16.37 | |
| Communication | 2.50 | 9.25 | 2.31 | 10.31 | |
| Education | 1.54 | 22.99 | -4.62 | 23.89 | |
| Hobby and Leisure | -0.36 | 26.08 | -9.15 | 47.76 | |
| Going out | -0.46 | 19.12 | 9.62 | 36.98 | |
| Allowances | -0.40 | 23.69 | 3.31 | 27.09 | |

| Household possession of durable consumer good | NN (2330) | | NY (13) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.39 | 0.08 | 0.64 | |
| Cupboard | 0.01 | 0.51 | 0.00 | 0.71 | |
| Microwave | 0.02 | 0.30 | 0.23 | 0.44 | ** |
| Refrigerator | 0.01 | 0.42 | 0.15 | 0.55 | |
| Automatic Dishwasher | 0.01 | 0.21 | 0.00 | 0.00 | |
| Vacuum Cleaner | 0.03 | 0.51 | 0.31 | 0.48 | ** |
| Laundry Machine | 0.02 | 0.32 | 0.15 | 0.55 | |
| Cloths Dryer | 0.00 | 0.22 | 0.00 | 0.00 | |
| Sewing Machine | 0.01 | 0.36 | 0.00 | 0.00 | |
| Electric Fan | 0.06 | 0.71 | 0.15 | 0.38 | |
| Air Conditioner | 0.07 | 0.79 | -0.08 | 0.76 | |
| Fan Heater | 0.03 | 0.65 | -0.15 | 0.69 | |
| “Kotatsu” Heater | -0.02 | 0.52 | 0.08 | 0.49 | |
| TV Set | 0.05 | 0.73 | 0.38 | 0.65 | |
| Stereo Sound System | 0.00 | 0.51 | 0.31 | 0.48 | ** |
| CD Radio Cassette Recorder | 0.03 | 0.52 | -0.31 | 0.48 | ** |
| VCR | 0.02 | 0.64 | 0.31 | 0.48 | |
| Video Camera | 0.03 | 0.32 | -0.08 | 0.28 | |
| Telephone | 0.04 | 0.87 | 0.15 | 0.69 | |
| Bicycle | 0.10 | 0.87 | 0.08 | 1.55 | |
| Car | 0.02 | 0.50 | -0.23 | 0.60 | |
| TV Game | 0.10 | 0.69 | 0.23 | 0.44 | |
| Word Processor | -0.02 | 0.40 | -0.23 | 0.44 | |
| Personal Computer | 0.13 | 0.49 | 0.23 | 0.60 | |
| FAX | 0.06 | 0.36 | 0.31 | 0.63 | ** |
| Mobile Phone | 0.21 | 0.65 | 0.31 | 0.95 | |

| | Time-use patterns (minutes) | NN (2330) | | NY (13) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.46 | 30.20 | 4.62 | 16.65 | |
| | Work | -1.04 | 161.62 | 4.85 | 105.10 | |
| | Study | -1.46 | 52.31 | -4.62 | 29.61 | |
| | House K. and Taking C.C. | 2.73 | 185.41 | -110.38 | 220.87 | ** |
| | Hobby, Leisure, Going out | 0.86 | 136.47 | 0.23 | 142.87 | |
| | Sleep, Eat, P-Hygiene | -0.50 | 167.04 | 92.85 | 234.96 | ** |
| Wife Weekends/Holidays | Commuting | 0.25 | 14.76 | 0.00 | 0.00 | |
| | Work | -1.40 | 70.92 | 0.00 | 0.00 | |
| | Study | -1.68 | 52.97 | -9.23 | 33.28 | |
| | House K. and Taking C.C. | 10.36 | 192.64 | -83.31 | 135.10 | |
| | Hobby, Leisure, Going out | -6.84 | 197.14 | -27.23 | 178.01 | |
| | Sleep, Eat, P-Hygiene | -1.01 | 195.25 | 115.62 | 259.71 | ** |
| Husband, Working Days | Commuting | -0.93 | 47.07 | -0.38 | 73.03 | |
| | Work | -0.23 | 123.09 | -8.23 | 114.82 | |
| | Study | 0.71 | 33.96 | 4.38 | 56.74 | |
| | House K. and Taking C.C. | 0.11 | 67.82 | -0.46 | 42.44 | |
| | Hobby, Leisure, Going out | 3.03 | 110.37 | 23.38 | 83.86 | |
| | Sleep, Eat, P-Hygiene | -1.44 | 126.18 | -18.69 | 89.08 | |
| Husband, Weekends/Holidays | Commuting | 0.07 | 12.33 | 0.00 | 0.00 | |
| | Work | -0.84 | 84.50 | 5.00 | 40.11 | |
| | Study | 1.27 | 64.33 | 5.17 | 69.55 | |
| | House K. and Taking C.C. | 1.31 | 166.53 | -89.50 | 153.94 | |
| | Hobby, Leisure, Going out | -2.36 | 238.94 | -79.67 | 279.45 | |
| | Sleep, Eat, P-Hygiene | 0.87 | 230.46 | 150.00 | 274.18 | ** |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-4. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Started new lessons or learning

| Indicators for ultimate utility | NN (1967) | | NY (64) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.050 | 0.690 | 0.000 | 0.620 | |
| Life Satisfaction | -0.040 | 0.850 | -0.270 | 0.820 | ** |
| Living Standard | -0.020 | 0.580 | -0.080 | 0.510 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (1967) | | NY (64) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.02 | 29.85 | -1.27 | 39.93 | |
| Housing (Rent/Mortgage) | 0.37 | 49.35 | 13.45 | 125.54 | |
| Water, Gas, Electricity | 0.80 | 12.17 | 1.91 | 10.68 | |
| Furniture and Household Appliances | -1.25 | 27.97 | 4.89 | 23.55 | |
| Clothing and Shoes | 0.52 | 16.38 | 1.58 | 27.45 | |
| Medical and Insurance | -0.29 | 24.95 | -1.69 | 11.93 | |
| Transportation | 4.79 | 71.48 | -3.83 | 27.85 | |
| Communication | 2.51 | 9.03 | 2.36 | 13.12 | |
| Education | 1.62 | 23.39 | -0.20 | 17.55 | |
| Hobby and Leisure | -0.63 | 24.74 | 1.98 | 21.20 | |
| Going out | -0.16 | 19.73 | 0.56 | 14.75 | |
| Allowances | -0.69 | 24.39 | 4.16 | 19.31 | |

| Household possession of durable consumer good | NN (1967) | | NY (64) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.39 | 0.02 | 0.45 | |
| Cupboard | 0.00 | 0.51 | 0.14 | 0.69 | ** |
| Microwave | 0.01 | 0.29 | 0.13 | 0.38 | ** |
| Refrigerator | 0.01 | 0.40 | 0.13 | 0.58 | ** |
| Automatic Dishwasher | 0.01 | 0.22 | 0.02 | 0.12 | |
| Vacuum Cleaner | 0.03 | 0.51 | 0.09 | 0.50 | |
| Laundry Machine | 0.01 | 0.32 | 0.06 | 0.30 | |
| Cloths Dryer | 0.00 | 0.22 | -0.06 | 0.30 | ** |
| Sewing Machine | 0.01 | 0.35 | 0.03 | 0.35 | |
| Electric Fan | 0.05 | 0.71 | 0.11 | 0.80 | |
| Air Conditioner | 0.06 | 0.78 | 0.19 | 0.66 | |
| Fan Heater | 0.03 | 0.65 | 0.02 | 0.79 | |
| “Kotatsu” Heater | -0.02 | 0.52 | 0.03 | 0.53 | |
| TV Set | 0.06 | 0.73 | 0.03 | 0.67 | |
| Stereo Sound System | 0.00 | 0.52 | -0.11 | 0.48 | |
| CD Radio Cassette Recorder | 0.03 | 0.51 | 0.06 | 0.66 | |
| VCR | 0.01 | 0.64 | 0.05 | 0.65 | |
| Video Camera | 0.03 | 0.32 | 0.03 | 0.31 | |
| Telephone | 0.05 | 0.87 | 0.34 | 1.01 | ** |
| Bicycle | 0.09 | 0.87 | 0.20 | 0.78 | |
| Car | 0.02 | 0.50 | 0.09 | 0.58 | |
| TV Game | 0.10 | 0.70 | -0.03 | 0.59 | |
| Word Processor | -0.02 | 0.40 | -0.03 | 0.25 | |
| Personal Computer | 0.12 | 0.48 | 0.30 | 0.63 | ** |
| FAX | 0.06 | 0.36 | 0.13 | 0.45 | |
| Mobile Phone | 0.22 | 0.64 | 0.34 | 0.74 | |

| | Time-use patterns (minutes) | NN (1967) | | NY (64) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.25 | 29.44 | 3.77 | 27.39 | |
| | Work | -1.70 | 157.37 | 5.75 | 188.01 | |
| | Study | -0.43 | 41.14 | 14.23 | 47.48 | ** |
| | House K. and Taking C.C. | 3.45 | 191.21 | -28.34 | 160.99 | |
| | Hobby, Leisure, Going out | -0.61 | 136.04 | 14.25 | 151.34 | |
| | Sleep, Eat, P-Hygiene | 0.01 | 168.85 | -10.50 | 145.83 | |
| Wife Weekends/Holidays | Commuting | 0.33 | 12.51 | 3.69 | 28.04 | ** |
| | Work | -1.36 | 69.16 | -0.94 | 25.05 | |
| | Study | -1.19 | 43.49 | 27.28 | 76.26 | ** |
| | House K. and Taking C.C. | 10.49 | 198.31 | -4.78 | 178.39 | |
| | Hobby, Leisure, Going out | -8.19 | 196.84 | 20.73 | 195.90 | |
| | Sleep, Eat, P-Hygiene | -0.20 | 197.40 | -45.14 | 185.37 | |
| Husband, Working Days | Commuting | -0.89 | 47.28 | 5.97 | 34.38 | |
| | Work | -1.09 | 126.40 | -4.60 | 82.12 | |
| | Study | 0.82 | 35.15 | 0.10 | 13.62 | |
| | House K. and Taking C.C. | -0.24 | 72.37 | -6.07 | 63.41 | |
| | Hobby, Leisure, Going out | 4.42 | 111.10 | -12.08 | 105.71 | |
| | Sleep, Eat, P-Hygiene | -1.81 | 125.96 | 22.08 | 112.15 | |
| Husband, Weekends/Holidays | Commuting | -0.13 | 11.07 | -0.08 | 13.25 | |
| | Work | -0.82 | 84.12 | -21.00 | 124.94 | |
| | Study | 1.79 | 65.94 | -0.05 | 45.00 | |
| | House K. and Taking C.C. | -0.69 | 167.86 | 21.98 | 199.00 | |
| | Hobby, Leisure, Going out | -4.57 | 241.19 | -1.80 | 253.03 | |
| | Sleep, Eat, P-Hygiene | 4.70 | 232.31 | 9.05 | 231.11 | |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-5. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Took a leadership of a committee, club or organization

| Indicators for ultimate utility | NN (1768) | | NY (235) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.040 | 0.690 | -0.040 | 0.680 | |
| Life Satisfaction | -0.050 | 0.870 | -0.100 | 0.740 | |
| Living Standard | -0.030 | 0.570 | -0.050 | 0.590 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (1768) | | NY (235) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.14 | 27.57 | 4.09 | 33.48 | |
| Housing (Rent/Mortgage) | 2.17 | 44.97 | -7.72 | 77.03 | ** |
| Water, Gas, Electricity | 0.89 | 9.45 | 1.15 | 11.41 | |
| Furniture and Household Appliances | -0.69 | 26.75 | -0.55 | 26.42 | |
| Clothing and Shoes | 0.47 | 18.34 | -0.35 | 15.36 | |
| Medical and Insurance | -0.28 | 21.23 | -3.37 | 23.65 | ** |
| Transportation | 4.54 | 70.67 | 2.64 | 29.62 | |
| Communication | 2.34 | 9.24 | 3.21 | 9.80 | |
| Education | 1.61 | 21.04 | 3.23 | 29.45 | |
| Hobby and Leisure | -0.79 | 26.87 | 3.69 | 21.52 | ** |
| Going out | -0.24 | 18.98 | -1.37 | 18.30 | |
| Allowances | -0.42 | 23.66 | 1.64 | 22.50 | |

| Household possession of durable consumer good | NN (1768) | | NY (235) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.40 | -0.01 | 0.33 | |
| Cupboard | 0.02 | 0.51 | -0.01 | 0.49 | |
| Microwave | 0.02 | 0.31 | -0.03 | 0.27 | ** |
| Refrigerator | 0.02 | 0.42 | -0.04 | 0.37 | ** |
| Automatic Dishwasher | 0.01 | 0.21 | 0.03 | 0.23 | |
| Vacuum Cleaner | 0.03 | 0.51 | 0.01 | 0.47 | |
| Laundry Machine | 0.02 | 0.33 | -0.02 | 0.28 | |
| Cloths Dryer | 0.00 | 0.23 | 0.02 | 0.22 | |
| Sewing Machine | 0.02 | 0.36 | -0.01 | 0.30 | |
| Electric Fan | 0.07 | 0.71 | -0.03 | 0.70 | |
| Air Conditioner | 0.06 | 0.76 | 0.00 | 0.88 | |
| Fan Heater | 0.03 | 0.63 | 0.02 | 0.79 | |
| “Kotatsu” Heater | -0.02 | 0.50 | 0.00 | 0.57 | |
| TV Set | 0.06 | 0.74 | 0.03 | 0.76 | |
| Stereo Sound System | 0.00 | 0.50 | 0.00 | 0.55 | |
| CD Radio Cassette Recorder | 0.02 | 0.51 | 0.05 | 0.59 | |
| VCR | 0.02 | 0.65 | 0.04 | 0.68 | |
| Video Camera | 0.04 | 0.30 | 0.00 | 0.40 | |
| Telephone | 0.05 | 0.84 | 0.09 | 0.95 | |
| Bicycle | 0.10 | 0.81 | 0.11 | 1.04 | |
| Car | 0.02 | 0.52 | -0.01 | 0.40 | |
| TV Game | 0.09 | 0.67 | 0.13 | 0.76 | |
| Word Processor | -0.03 | 0.40 | 0.02 | 0.40 | |
| Personal Computer | 0.12 | 0.48 | 0.19 | 0.57 | ** |
| FAX | 0.05 | 0.35 | 0.11 | 0.36 | ** |
| Mobile Phone | 0.19 | 0.63 | 0.23 | 0.69 | |

| | Time-use patterns (minutes) | NN (1768) | | NY (235) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.92 | 32.42 | 1.41 | 25.67 | |
| | Work | -6.02 | 165.23 | 31.09 | 141.27 | ** |
| | Study | -1.56 | 53.87 | -2.72 | 45.79 | |
| | House K. and Taking C.C. | 7.81 | 186.57 | -36.66 | 166.26 | ** |
| | Hobby, Leisure, Going out | 1.47 | 141.31 | 2.08 | 115.14 | |
| | Sleep, Eat, P-Hygiene | -0.19 | 164.84 | 2.25 | 161.88 | |
| Wife Weekends/Holidays | Commuting | 0.47 | 16.95 | -0.52 | 7.83 | |
| | Work | -0.92 | 76.37 | -0.01 | 41.14 | |
| | Study | -1.61 | 56.92 | -1.73 | 47.87 | |
| | House K. and Taking C.C. | 15.12 | 192.05 | -26.14 | 184.76 | ** |
| | Hobby, Leisure, Going out | -8.42 | 203.68 | 8.68 | 176.71 | |
| | Sleep, Eat, P-Hygiene | -5.01 | 195.73 | 21.33 | 172.31 | ** |
| Husband, Working Days | Commuting | -0.81 | 47.19 | 0.57 | 41.07 | |
| | Work | -1.01 | 120.68 | 2.13 | 112.98 | |
| | Study | 1.43 | 37.40 | -0.84 | 28.41 | |
| | House K. and Taking C.C. | 0.05 | 73.00 | 3.53 | 55.90 | |
| | Hobby, Leisure, Going out | 4.28 | 110.30 | 1.81 | 99.61 | |
| | Sleep, Eat, P-Hygiene | -1.71 | 124.06 | -7.91 | 118.46 | |
| Husband, Weekends/Holidays | Commuting | 0.11 | 14.61 | -0.02 | 7.94 | |
| | Work | -0.66 | 84.33 | -6.44 | 99.35 | |
| | Study | 2.10 | 74.20 | -2.38 | 41.86 | |
| | House K. and Taking C.C. | 5.71 | 172.16 | -7.50 | 171.93 | |
| | Hobby, Leisure, Going out | -7.87 | 242.10 | 0.33 | 228.40 | |
| | Sleep, Eat, P-Hygiene | 1.29 | 231.35 | 15.53 | 225.10 | |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-6. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - A family member had entrance exams and enrolled to a school

| Indicators for ultimate utility | NN (1877) | | NY (235) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.050 | 0.690 | -0.030 | 0.630 | |
| Life Satisfaction | -0.050 | 0.870 | 0.010 | 0.800 | |
| Living Standard | -0.020 | 0.580 | -0.040 | 0.520 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (1877) | | NY (235) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.06 | 28.87 | 4.04 | 30.93 | |
| Housing (Rent/Mortgage) | 1.08 | 38.70 | 3.03 | 73.74 | |
| Water, Gas, Electricity | 1.02 | 10.40 | 0.66 | 19.13 | |
| Furniture and Household Appliances | -0.77 | 28.00 | -1.98 | 23.23 | |
| Clothing and Shoes | 0.41 | 18.06 | 1.24 | 15.66 | |
| Medical and Insurance | -0.42 | 22.85 | 0.92 | 36.73 | |
| Transportation | 4.12 | 69.63 | 7.28 | 65.05 | |
| Communication | 2.27 | 9.30 | 3.34 | 9.07 | |
| Education | 1.28 | 21.74 | -1.16 | 26.08 | |
| Hobby and Leisure | -0.45 | 26.51 | 1.47 | 24.03 | |
| Going out | -0.44 | 19.95 | 0.30 | 18.88 | |
| Allowances | -0.55 | 23.74 | -0.62 | 24.94 | |

| Household possession of durable consumer good | NN (1877) | | NY (235) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.41 | 0.02 | 0.31 | |
| Cupboard | 0.01 | 0.52 | -0.04 | 0.48 | |
| Microwave | 0.02 | 0.32 | -0.01 | 0.23 | |
| Refrigerator | 0.02 | 0.44 | 0.00 | 0.33 | |
| Automatic Dishwasher | 0.01 | 0.22 | 0.01 | 0.18 | |
| Vacuum Cleaner | 0.04 | 0.52 | 0.00 | 0.47 | |
| Laundry Machine | 0.02 | 0.34 | 0.00 | 0.25 | |
| Cloths Dryer | 0.00 | 0.22 | 0.00 | 0.24 | |
| Sewing Machine | 0.02 | 0.36 | 0.00 | 0.33 | |
| Electric Fan | 0.06 | 0.72 | -0.03 | 0.68 | |
| Air Conditioner | 0.06 | 0.80 | 0.10 | 0.78 | |
| Fan Heater | 0.02 | 0.65 | 0.07 | 0.67 | |
| “Kotatsu” Heater | -0.02 | 0.53 | 0.00 | 0.49 | |
| TV Set | 0.04 | 0.74 | 0.04 | 0.64 | |
| Stereo Sound System | 0.00 | 0.50 | 0.00 | 0.54 | |
| CD Radio Cassette Recorder | 0.02 | 0.52 | 0.05 | 0.50 | |
| VCR | 0.02 | 0.64 | 0.03 | 0.56 | |
| Video Camera | 0.04 | 0.32 | 0.00 | 0.28 | |
| Telephone | 0.03 | 0.85 | 0.05 | 0.86 | |
| Bicycle | 0.11 | 0.81 | 0.10 | 1.08 | |
| Car | 0.02 | 0.53 | 0.03 | 0.37 | |
| TV Game | 0.11 | 0.67 | 0.07 | 0.77 | |
| Word Processor | -0.02 | 0.40 | 0.02 | 0.39 | |
| Personal Computer | 0.13 | 0.49 | 0.14 | 0.53 | |
| FAX | 0.06 | 0.36 | 0.04 | 0.27 | |
| Mobile Phone | 0.18 | 0.61 | 0.37 | 0.68 | ** |

| | Time-use patterns (minutes) | NN (1877) | | NY (235) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.55 | 31.45 | 1.50 | 25.13 | |
| | Work | -3.73 | 168.16 | 6.74 | 120.51 | |
| | Study | -2.13 | 53.26 | 0.30 | 55.91 | |
| | House K. and Taking C.C. | 5.69 | 187.25 | -12.79 | 159.54 | |
| | Hobby, Leisure, Going out | 0.38 | 139.80 | 10.86 | 130.81 | |
| | Sleep, Eat, P-Hygiene | 0.65 | 170.37 | -5.92 | 137.68 | |
| Wife Weekends/Holidays | Commuting | 0.51 | 15.74 | -0.51 | 13.50 | |
| | Work | -0.13 | 74.66 | -4.09 | 52.85 | |
| | Study | -2.12 | 56.10 | -0.53 | 41.56 | |
| | House K. and Taking C.C. | 11.16 | 193.79 | 15.20 | 174.42 | |
| | Hobby, Leisure, Going out | -7.23 | 201.85 | -7.28 | 162.79 | |
| | Sleep, Eat, P-Hygiene | -2.58 | 200.96 | -2.32 | 167.21 | |
| Husband, Working Days | Commuting | -0.06 | 44.72 | -1.87 | 54.34 | |
| | Work | -0.46 | 129.54 | 0.30 | 88.98 | |
| | Study | 0.76 | 35.91 | -1.09 | 24.60 | |
| | House K. and Taking C.C. | 0.95 | 76.51 | 1.20 | 40.25 | |
| | Hobby, Leisure, Going out | 1.95 | 112.56 | 6.85 | 94.75 | |
| | Sleep, Eat, P-Hygiene | -2.01 | 129.53 | -4.88 | 116.17 | |
| Husband, Weekends/Holidays | Commuting | 0.29 | 12.42 | -1.15 | 16.69 | |
| | Work | -0.49 | 88.35 | 0.87 | 87.78 | |
| | Study | 1.80 | 68.86 | 0.80 | 43.48 | |
| | House K. and Taking C.C. | 2.86 | 178.50 | 6.13 | 118.90 | |
| | Hobby, Leisure, Going out | -7.63 | 245.22 | 1.44 | 205.52 | |
| | Sleep, Eat, P-Hygiene | 3.46 | 239.98 | -7.84 | 196.21 | |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-7. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Wife – employed

| Indicators for ultimate utility | NN (772) | | NY (170) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.070 | 0.620 | -0.060 | 0.690 | |
| Life Satisfaction | -0.040 | 0.820 | -0.180 | 1.000 | |
| Living Standard | -0.020 | 0.550 | -0.090 | 0.680 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (772) | | NY (170) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.61 | 31.75 | 2.48 | 32.16 | |
| Housing (Rent/Mortgage) | 0.27 | 23.84 | 2.51 | 52.15 | |
| Water, Gas, Electricity | 0.68 | 14.28 | 1.18 | 10.93 | |
| Furniture and Household Appliances | -2.53 | 37.96 | -1.65 | 12.84 | |
| Clothing and Shoes | 0.17 | 15.80 | 3.27 | 15.09 | ** |
| Medical and Insurance | -1.25 | 25.52 | -3.41 | 15.88 | |
| Transportation | 4.33 | 59.50 | 4.17 | 77.52 | |
| Communication | 2.35 | 8.76 | 3.98 | 10.72 | ** |
| Education | 2.80 | 24.76 | -0.46 | 32.74 | |
| Hobby and Leisure | 0.01 | 19.38 | -1.31 | 26.57 | |
| Going out | 0.40 | 19.37 | 0.20 | 15.62 | |
| Allowances | -0.20 | 23.91 | 1.72 | 23.67 | |

| Household possession of durable consumer good | NN (772) | | NY (170) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.37 | 0.08 | 0.38 | |
| Cupboard | 0.02 | 0.42 | 0.02 | 0.39 | |
| Microwave | 0.02 | 0.22 | 0.01 | 0.23 | |
| Refrigerator | 0.01 | 0.25 | 0.01 | 0.31 | |
| Automatic Dishwasher | 0.01 | 0.20 | 0.04 | 0.24 | |
| Vacuum Cleaner | 0.03 | 0.44 | -0.04 | 0.42 | |
| Laundry Machine | 0.02 | 0.22 | -0.05 | 0.35 | ** |
| Cloths Dryer | 0.01 | 0.23 | 0.00 | 0.27 | |
| Sewing Machine | 0.03 | 0.33 | 0.02 | 0.33 | |
| Electric Fan | 0.08 | 0.58 | 0.09 | 0.60 | |

Air Condi35191 114z (Aif 2048 TL ( )Tj /114 re f 5193 155869 54f ( )Tj /F1 2048z (Electric Fan)Tj /F1 2048 Tf 100 Tz ( )Tj /F1 2048 Tf 0.04883 /F1 2048 Tf 100 38 TL (4(0.08 )Tj /F1 2048 -08 Tf 2048 Tf 0.0

Table A-8. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Wife – Full-time position

| Indicators for ultimate utility | NN (441) | | NY (32) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.040 | 0.690 | 0.190 | 0.970 | |
| Life Satisfaction | -0.020 | 0.830 | 0.160 | 0.880 | |
| Living Standard | -0.010 | 0.600 | 0.000 | 0.620 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (441) | | NY (32) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 3.19 | 26.48 | 8.06 | 33.43 | |
| Housing (Rent/Mortgage) | -1.30 | 73.40 | 2.34 | 25.46 | |
| Water, Gas, Electricity | 0.99 | 9.45 | 1.38 | 10.68 | |
| Furniture and Household Appliances | 0.08 | 17.59 | 1.47 | 15.02 | |
| Clothing and Shoes | -0.12 | 13.87 | -1.66 | 21.37 | |
| Medical and Insurance | -0.31 | 18.68 | -7.59 | 28.55 | ** |
| Transportation | 7.34 | 96.68 | 0.47 | 19.42 | |
| Communication | 2.48 | 8.41 | 7.28 | 13.43 | ** |
| Education | 1.42 | 22.84 | 3.56 | 13.21 | |
| Hobby and Leisure | -0.82 | 21.53 | 0.47 | 18.64 | |
| Going out | 0.74 | 16.61 | -1.53 | 16.86 | |
| Allowances | -0.77 | 24.83 | 0.00 | 17.95 | |

| Household possession of durable consumer good | NN (441) | | NY (32) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.00 | 0.38 | 0.03 | 0.47 | |
| Cupboard | 0.00 | 0.55 | 0.00 | 0.44 | |
| Microwave | 0.00 | 0.30 | -0.09 | 0.30 | |
| Refrigerator | 0.00 | 0.40 | 0.03 | 0.31 | |
| Automatic Dishwasher | 0.00 | 0.21 | 0.00 | 0.25 | |
| Vacuum Cleaner | 0.02 | 0.50 | 0.00 | 0.36 | |
| Laundry Machine | 0.01 | 0.33 | -0.06 | 0.25 | |
| Cloths Dryer | 0.00 | 0.20 | 0.00 | 0.25 | |
| Sewing Machine | 0.00 | 0.40 | 0.13 | 0.34 | |
| Electric Fan | 0.00 | 0.77 | 0.09 | 0.73 | |
| Air Conditioner | 0.02 | 0.71 | 0.13 | 0.55 | |
| Fan Heater | 0.04 | 0.75 | 0.16 | 0.63 | |
| “Kotatsu” Heater | -0.05 | 0.47 | 0.00 | 0.57 | |
| TV Set | 0.01 | 0.71 | 0.06 | 0.67 | |
| Stereo Sound System | 0.01 | 0.54 | 0.13 | 0.55 | |
| CD Radio Cassette Recorder | 0.03 | 0.51 | 0.03 | 0.59 | |
| VCR | -0.03 | 0.63 | -0.09 | 0.64 | |
| Video Camera | 0.01 | 0.28 | 0.06 | 0.35 | |
| Telephone | 0.00 | 0.76 | 0.34 | 0.94 | ** |
| Bicycle | 0.09 | 0.93 | 0.38 | 0.83 | |
| Car | 0.01 | 0.44 | 0.03 | 0.47 | |
| TV Game | 0.12 | 0.70 | 0.19 | 0.59 | |
| Word Processor | -0.03 | 0.38 | 0.09 | 0.53 | |
| Personal Computer | 0.09 | 0.42 | 0.28 | 0.52 | ** |
| FAX | 0.03 | 0.36 | 0.13 | 0.42 | |
| Mobile Phone | 0.24 | 0.72 | 0.28 | 0.73 | |

| | Time-use patterns (minutes) | NN (441) | | NY (32) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -1.35 | 30.64 | -9.47 | 49.66 | |
| | Work | 3.80 | 97.39 | 30.28 | 139.15 | |
| | Study | -0.40 | 43.54 | -0.13 | 80.51 | |
| | House K. and Taking C.C. | -2.91 | 125.34 | -29.00 | 151.18 | |
| | Hobby, Leisure, Going out | -4.81 | 118.81 | 12.66 | 120.34 | |
| | Sleep, Eat, P-Hygiene | 6.54 | 157.50 | 4.09 | 139.05 | |
| Wife Weekends/Holidays | Commuting | -0.02 | 13.96 | -3.56 | 21.27 | |
| | Work | -5.99 | 96.89 | 22.50 | 92.39 | |
| | Study | -1.48 | 51.76 | 16.69 | 53.15 | |
| | House K. and Taking C.C. | -1.33 | 166.98 | -11.53 | 240.80 | |
| | Hobby, Leisure, Going out | -12.76 | 190.35 | -30.03 | 249.60 | |
| | Sleep, Eat, P-Hygiene | 20.73 | 197.83 | 9.31 | 192.94 | |
| Husband, Working Days | Commuting | 0.59 | 57.44 | 5.53 | 47.24 | |
| | Work | -0.89 | 102.97 | 34.58 | 80.74 | |
| | Study | 0.78 | 25.38 | 6.32 | 18.92 | |
| | House K. and Taking C.C. | -1.51 | 51.16 | -3.05 | 57.91 | |
| | Hobby, Leisure, Going out | 3.48 | 115.24 | -60.68 | 121.50 | ** |
| | Sleep, Eat, P-Hygiene | -1.11 | 145.54 | 31.53 | 103.29 | |
| Husband, Weekends/Holidays | Commuting | -0.01 | 6.93 | 0.00 | 0.00 | |
| | Work | -0.54 | 71.88 | 10.17 | 42.89 | |
| | Study | 0.02 | 42.86 | 16.50 | 45.18 | |
| | House K. and Taking C.C. | -11.31 | 146.52 | 36.72 | 161.89 | |
| | Hobby, Leisure, Going out | -1.87 | 233.55 | -143.67 | 205.61 | ** |
| | Sleep, Eat, P-Hygiene | 12.34 | 244.55 | 80.28 | 243.19 | |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-9. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Started living in a detached single family house

| Indicators for ultimate utility | NN (948) | | NY (65) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.060 | 0.670 | -0.050 | 0.650 | |
| Life Satisfaction | -0.030 | 0.900 | 0.020 | 0.990 | |
| Living Standard | -0.030 | 0.580 | 0.140 | 0.700 | ** |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (948) | | NY (65) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 1.81 | 27.09 | 8.00 | 31.40 | |
| Housing (Rent/Mortgage) | 1.59 | 22.04 | -37.66 | 49.33 | ** |
| Water, Gas, Electricity | 0.89 | 9.24 | 2.14 | 11.67 | |
| Furniture and Household Appliances | -0.33 | 18.37 | 6.00 | 30.27 | ** |
| Clothing and Shoes | 1.13 | 16.93 | 4.51 | 16.75 | |
| Medical and Insurance | -0.62 | 21.89 | 4.72 | 22.19 | |
| Transportation | 4.24 | 79.63 | 14.80 | 118.62 | |
| Communication | 2.59 | 9.55 | 3.40 | 11.54 | |
| Education | 1.55 | 16.16 | -2.48 | 18.03 | |
| Hobby and Leisure | 0.43 | 28.97 | -2.46 | 19.82 | |
| Going out | 0.05 | 19.65 | 1.25 | 17.96 | |
| Allowances | 0.26 | 23.22 | -3.25 | 23.58 | |

| Household possession of durable consumer good | NN (948) | | NY (65) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.01 | 0.32 | 0.23 | 0.61 | ** |
| Cupboard | -0.02 | 0.34 | 0.02 | 0.54 | |
| Microwave | 0.01 | 0.25 | 0.03 | 0.35 | |
| Refrigerator | 0.00 | 0.25 | 0.08 | 0.32 | ** |
| Automatic Dishwasher | 0.00 | 0.19 | 0.15 | 0.40 | ** |
| Vacuum Cleaner | 0.01 | 0.37 | 0.28 | 0.63 | ** |
| Laundry Machine | 0.01 | 0.22 | 0.03 | 0.30 | |
| Cloths Dryer | 0.00 | 0.20 | 0.08 | 0.41 | ** |
| Sewing Machine | 0.02 | 0.31 | 0.09 | 0.38 | |
| Electric Fan | 0.04 | 0.46 | 0.33 | 0.78 | ** |
| Air Conditioner | 0.03 | 0.54 | 1.23 | 1.57 | ** |
| Fan Heater | 0.03 | 0.44 | 0.20 | 0.90 | ** |
| “Kotatsu” Heater | -0.02 | 0.36 | -0.05 | 0.48 | |
| TV Set | 0.04 | 0.46 | 0.49 | 0.87 | ** |
| Stereo Sound System | 0.01 | 0.45 | 0.00 | 0.53 | |
| CD Radio Cassette Recorder | 0.02 | 0.50 | 0.00 | 0.61 | |
| VCR | 0.02 | 0.55 | 0.14 | 0.90 | |
| Video Camera | 0.04 | 0.30 | 0.08 | 0.37 | |
| Telephone | 0.03 | 0.67 | 0.32 | 1.02 | ** |
| Bicycle | 0.12 | 0.77 | 0.14 | 1.10 | |
| Car | 0.02 | 0.35 | 0.14 | 0.39 | ** |
| TV Game | 0.10 | 0.70 | 0.05 | 0.67 | |
| Word Processor | -0.02 | 0.36 | 0.00 | 0.53 | |
| Personal Computer | 0.11 | 0.49 | 0.18 | 0.53 | |
| FAX | 0.05 | 0.32 | 0.11 | 0.44 | |
| Mobile Phone | 0.18 | 0.62 | 0.32 | 0.79 | |

| | Time-use patterns (minutes) | NN (948) | | NY (65) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.34 | 30.08 | 1.71 | 35.00 | |
| | Work | -1.73 | 163.09 | 1.08 | 243.13 | |
| | Study | -1.51 | 48.95 | -7.42 | 42.97 | |
| | House K. and Taking C.C. | 8.01 | 204.89 | 23.80 | 253.93 | |
| | Hobby, Leisure, Going out | 0.25 | 145.97 | 0.72 | 178.67 | |
| | Sleep, Eat, P-Hygiene | -4.23 | 170.71 | -14.08 | 158.01 | |
| Wife Weekends/Holidays | Commuting | 0.04 | 15.25 | 0.00 | 0.00 | |
| | Work | -2.62 | 79.16 | 0.95 | 45.07 | |
| | Study | -3.19 | 49.45 | -7.65 | 59.41 | |
| | House K. and Taking C.C. | 18.35 | 205.17 | 40.87 | 228.81 | |
| | Hobby, Leisure, Going out | -13.66 | 205.06 | -13.54 | 187.41 | |
| | Sleep, Eat, P-Hygiene | 1.01 | 194.21 | -16.35 | 226.21 | |
| Husband, Working Days | Commuting | -1.60 | 45.99 | 3.17 | 49.17 | |
| | Work | 2.27 | 121.74 | -26.62 | 168.69 | |
| | Study | 1.05 | 37.78 | -2.25 | 37.06 | |
| | House K. and Taking C.C. | 1.95 | 60.51 | 8.26 | 129.94 | |
| | Hobby, Leisure, Going out | 3.25 | 99.42 | 16.92 | 117.71 | |
| | Sleep, Eat, P-Hygiene | -5.82 | 128.75 | 13.75 | 122.38 | |
| Husband, Weekends/Holidays | Commuting | 0.36 | 18.58 | -0.08 | 0.55 | |
| | Work | 0.43 | 99.34 | -9.23 | 56.22 | |
| | Study | -0.17 | 59.61 | 14.88 | 68.15 | |
| | House K. and Taking C.C. | 12.38 | 164.38 | -7.98 | 234.01 | |
| | Hobby, Leisure, Going out | -12.07 | 231.76 | 41.31 | 288.65 | |
| | Sleep, Eat, P-Hygiene | -0.61 | 218.65 | -36.83 | 264.37 | |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.

Table A-10. Results of the panel analysis for self-reported ultimate utility indicators and consumption patterns between those who experienced the events (NY) and those who did not (NN) - Starting living in an own condominium or house

| Indicators for ultimate utility | NN (397) | | NY (463) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Happiness | -0.020 | 0.710 | -0.100 | 0.700 | |
| Life Satisfaction | 0.010 | 0.910 | -0.100 | 0.910 | |
| Living Standard | 0.030 | 0.580 | -0.040 | 0.610 | |

| Household spending allocation for the month of September (1,000 Yen) (1,000 yen) | NN (397) | | NY (463) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Food | 2.66 | 28.71 | 0.28 | 27.76 | |
| Housing (Rent/Mortgage) | 3.46 | 17.44 | -5.53 | 31.25 | ** |
| Water, Gas, Electricity | 1.02 | 8.62 | 1.04 | 8.25 | |
| Furniture and Household Appliances | -1.04 | 20.93 | 0.44 | 19.38 | |
| Clothing and Shoes | 1.38 | 16.24 | 1.16 | 16.50 | |
| Medical and Insurance | -1.90 | 24.26 | 1.07 | 23.32 | |
| Transportation | 15.31 | 82.33 | -4.48 | 83.09 | ** |
| Communication | 3.05 | 9.19 | 2.22 | 10.85 | |
| Education | 2.77 | 22.68 | -0.03 | 23.21 | |
| Hobby and Leisure | -0.43 | 24.69 | 0.49 | 26.53 | |
| Going out | 0.06 | 17.73 | -0.51 | 20.56 | |
| Allowances | -0.71 | 23.97 | -1.00 | 21.10 | |

| Household possession of durable consumer good | NN (397) | | NY (463) | | Significance |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Dining Set | 0.03 | 0.34 | 0.02 | 0.37 | |
| Cupboard | 0.00 | 0.28 | -0.03 | 0.40 | |
| Microwave | 0.01 | 0.23 | 0.01 | 0.27 | |
| Refrigerator | 0.00 | 0.25 | 0.01 | 0.27 | |
| Automatic Dishwasher | -0.01 | 0.19 | 0.03 | 0.22 | ** |
| Vacuum Cleaner | 0.01 | 0.34 | 0.04 | 0.41 | |
| Laundry Machine | 0.01 | 0.22 | 0.00 | 0.23 | |
| Cloths Dryer | -0.01 | 0.19 | 0.01 | 0.23 | |
| Sewing Machine | 0.01 | 0.30 | 0.03 | 0.35 | |
| Electric Fan | 0.07 | 0.42 | 0.09 | 0.59 | |
| Air Conditioner | 0.04 | 0.52 | 0.16 | 0.79 | ** |
| Fan Heater | 0.05 | 0.48 | 0.06 | 0.54 | |
| “Kotatsu” Heater | -0.04 | 0.32 | 0.00 | 0.40 | |
| TV Set | 0.08 | 0.43 | 0.09 | 0.55 | |
| Stereo Sound System | 0.01 | 0.44 | 0.04 | 0.48 | |
| CD Radio Cassette Recorder | 0.03 | 0.49 | -0.02 | 0.50 | |
| VCR | 0.00 | 0.53 | 0.07 | 0.61 | |
| Video Camera | 0.05 | 0.31 | 0.03 | 0.30 | |
| Telephone | 0.04 | 0.71 | 0.08 | 0.70 | |
| Bicycle | 0.15 | 0.76 | 0.08 | 0.87 | |
| Car | 0.03 | 0.34 | 0.02 | 0.42 | |
| TV Game | 0.13 | 0.70 | 0.08 | 0.74 | |
| Word Processor | -0.01 | 0.37 | -0.03 | 0.38 | |
| Personal Computer | 0.09 | 0.43 | 0.13 | 0.44 | |
| FAX | 0.04 | 0.30 | 0.07 | 0.35 | |
| Mobile Phone | 0.14 | 0.60 | 0.24 | 0.70 | ** |

| | Time-use patterns (minutes) | NN (397) | | NY (463) | | Significance |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Wife, Working Days | Commuting | -0.85 | 32.52 | 1.43 | 31.26 | |
| | Work | -7.95 | 174.65 | 1.31 | 184.67 | |
| | Study | -2.75 | 51.92 | -2.71 | 44.91 | |
| | House K. and Taking C.C. | 7.66 | 208.78 | 14.40 | 220.93 | |
| | Hobby, Leisure, Going out | 2.04 | 140.74 | -7.59 | 156.35 | |
| | Sleep, Eat, P-Hygiene | -0.47 | 172.21 | -3.11 | 175.47 | |
| Wife Weekends/Holidays | Commuting | 1.06 | 13.83 | -0.42 | 13.35 | |
| | Work | 1.99 | 80.78 | -8.05 | 77.56 | |
| | Study | -3.99 | 58.27 | -3.52 | 44.96 | |
| | House K. and Taking C.C. | 13.94 | 199.55 | 26.81 | 228.50 | |
| | Hobby, Leisure, Going out | -11.67 | 199.79 | -16.90 | 216.42 | |
| | Sleep, Eat, P-Hygiene | -3.41 | 182.31 | 5.00 | 210.10 | |
| Husband, Working Days | Commuting | 3.19 | 54.23 | -0.76 | 49.67 | |
| | Work | 5.03 | 132.25 | -3.84 | 135.52 | |
| | Study | -3.12 | 32.89 | 4.85 | 43.29 | |
| | House K. and Taking C.C. | -3.82 | 70.30 | 3.31 | 65.72 | ** |
| | Hobby, Leisure, Going out | 6.71 | 109.20 | -0.30 | 113.89 | |
| | Sleep, Eat, P-Hygiene | -8.56 | 135.23 | 0.48 | 135.52 | |
| Husband, Weekends/Holidays | Commuting | 0.02 | 11.38 | 1.09 | 20.04 | |
| | Work | 2.10 | 111.15 | -1.65 | 101.50 | |
| | Study | -0.19 | 57.13 | 7.20 | 58.63 | |
| | House K. and Taking C.C. | 12.92 | 178.71 | 7.91 | 164.65 | |
| | Hobby, Leisure, Going out | -17.71 | 240.74 | -14.19 | 240.78 | |
| | Sleep, Eat, P-Hygiene | 1.53 | 209.42 | 0.95 | 235.81 | |

Asterisks (**) represent significantly difference by item at $p < 0.05$.
Numbers in parenthesis ( ) represent the number of observations.