Time and Monetary Budget Scenarios and Changes in Expenditures to Leisure Out-of-Home Activities: A Stated Adaptation Experiment

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ABSTRACT

Time constraint is an important concept in activity-based analysis as its aim is to understand the allocation of time to activities and travel in time and space. Time use for activities is however also affected by monetary constraints. Surprisingly, very few models include monetary budgets although many activities require money directly or indirectly. This paper documents the application of logit analysis to savings in time and money under different scenarios in the context of leisure activities.

Keywords: stated adaptation experiment, monetary budget, time budget, allocation

INTRODUCTION

Since the mid 1990s, activity-based models have been developed to better represent the decision mechanisms of individuals and households, to understand how time is spent on activities and travel and how activity-travel patterns emerge in time and space. The time constraint is a significant concept in most of these studies such as Albatross (Arentze & Timmermans, 2004) and Tasha (Roorda et al., 2008) as their aim is to understand the allocation of time to activities to predict activity-travel patterns. Time use studies in an activity-travel behaviour context typically examine time allocation to in-home and out-of-home activities for different socio-demographic variables (Bhat & Misra, 1999). However, time use for activities is also affected by monetary constraints and vice versa. As many activities require money directly or indirectly, the allocation of monetary budgets is important to understand the generation of activities and their associated travel.

The study of monetary constraints in activity participation has started in the mid-sixties. Becker (1965) proposed a micro-economic framework addressing the importance of monetary constraints in activity participation. In his framework, income was added as a constraint. Later, De Serpa (1971) and Evans (1972) proposed improvements and modifications of this model. According to these micro-economic theories, utility is a function of time spent on different activities and the consumption of goods during these activities which entails costs of the activity. Therefore, participation in an activity for a given duration implies a particular cost value. Constraints are derived from time and money budgets to conduct various activities.

These theories have provided the foundation for several subsequent studies that considered utility-maximizing behaviour subject to time and money constraints (e.g., Kockelman (2001), Jara-Diaz et al.(2008), Zhang (2009), Konduri et al. (2010), Arentze et al.(2011)). Although theories on money and time allocation are not new, they are mostly theoretical or use different data sets for time expenditure and money expenditure on activity category levels. Cross-sectional data on existing activity and expenditure patterns may be useful, but in addition consumer responses to dramatically changing situations are crucial for developing dynamic models. Since, in the longer run, incomes as well as prices of petrol, goods and agricultural products may significantly change, due to economic developments, depletion of materials and energy, and climate change, changes in activity-travel demands may be expected. These changes can also affect the working hours. Therefore, there is an interest in examining budgets to understand how individuals allocate their time and money to activities and travel and how they re-organize their activities in time and space given budget changes.

People conduct their activities under time and money budget constraints. The number of working hours and income in general dictates these constraints. Therefore, it is important to understand how people adapt their time and money allocation to their activities and how they change their behavior in order to save time and money when they face a change in these constraints. To understand how households reallocate their budgets in response to possible changes in budgets and how the changes in policies or exogenous factors impact overall activity-travel and expenditure patterns, data regarding current time and monetary budgets and expenditures in which households re-allocate their budgets to various objectives under hypothetical scenarios, such as decrease in income or increase in working hours needs to be collected. For this aim, a stated adaptation experiment was developed and applied in a survey. In transport research, the use of stated adaptation experiments has recently increased as this approach can capture behavioural responses state dependently which can improve policy impact analysis (Arentze et al., 2004, Nijland et al., 2006). Recently, Weis et al. (2010) applied a stated adaptation experiment in which scenarios are based on travel time changes affecting the time budget of respondents.

To better understand the saving adaptation decisions, this paper explains the survey design and descriptive of the data. Then, reports the results of a study that is conducted to better understand time and money savings under to leisure activities. Adaptation is modeled using standard logit analyses. The analyses are done separately for time saving and money saving situations. The paper is organized as follows. First, a multinomial logit model is estimated to analyze the effect of activity-specific variables, interactions between individual

variables and activity categories, and interactions between activity-specific variables and activity categories on the allocation of savings across activity categories. Then, as very few of the interaction effects between individual level variables and activity categories were found to significant, multi-nomial logit analysis is applied to clustered activities in order to understand the effect of individual-level variables. The paper is completed with a summary and conclusion.

DESIGN OF THE SURVEY

The questionnaire was developed and conducted online through a platform that is developed in Design and Decision Support Systems (DDSS) group at Technical University of Eindhoven to generate web-based questionnaires. The questionnaire consists of three parts as socio-demographic attributes, existing time and money expenditure and stated adaptation, which is further explained below.

The first part consists of questions about socio-economic attributes at the individual and household level such as gender, age, income, household size, education, car availability, and number of cars. In addition to that, more detailed questions about fixed time and money expenditures are added to the first part. In the second part, respondents were given a list of out-of-home leisure activities, using the following classification of out-of-home leisure activities: (i) Recreation such as walking in a park, cycling for pleasure, recreation near water or in a park, (ii) Sport Event Visit such as going to a football match, (iii) Sporting; (iv) Wellness, beauty and relaxation such as beauty treatments, sauna and spa visits, (v) Attraction Visit such as attraction park, zoo; (vi) Event Visit such as exhibition, fairs, festival, (vii) Culture such as going to cinema, concert, musical, museum, (viii) Going Out such as bar, café, disco visits, eating out, and (ix) Hobbies, Courses and Others such as club activities, courses for hobbies. Respondents were asked to report their average current time and money expenditure per episode on each out-of-home leisure activity and associated travel separately. In addition, they were asked how frequent each activity is conducted on average per month. The questionnaire platform allowed adding constraints to the questionnaire to avoid respondents writing unrealistic amounts.

In the third part, a stated adaptation experiment was conducted in which respondents were asked to save money or time from their out-of-home leisure activities, thus creating two scenarios (time saving or money saving). Each respondent had to answer a time saving and a money saving scenario, separately. For the application of stated adaptation experiment, first the monthly time and money expenditures on an activity were calculated by multiplying frequency with episode duration and expenditure, respectively. Reported time and money expenditures per episode on each out-of-home leisure activity and associated travel were used for this calculation. Time and money expenditure on out-of-home leisure activities is then obtained by totaling across the categories. Next, hypothetical scenarios were shown to the respondents based on their reported time and money expenditures. For each respondent, the scenario states that 30% of the overall duration and expenditure are shown as the amounts to be saved. Then respondents were asked to save this amount across the activity categories. A built-in calculator was added to the questionnaire, which allowed the system and also respondents to check if their savings add up to the stated amounts of

savings. If the amounts were unrealistic such as negative amounts, extreme amounts or they did not add up to the total amounts, respondents received a warning and could not continue to the next page. Moreover, respondents were asked to indicate how they would save time and money. This indication is made possible by giving options, which respondents could choose. Below are the structures of scenarios.

Time saving scenario

We have summarized your data from the previous page where you indicated your time expenditure and we calculated how much time you spend in total per month to each activity. We now ask you to imagine that you should save Y minutes in total from the activity categories below. For example, you can think of a situation that your working hours increased and you decided to save this amount only from your leisure activities. Please specify how you would like to do this by clicking the options below. You can choose multiple options. You can also calculate by using the calculate button to check whether the sum of your savings are equal to Y minute.

The following choice options are included for respondents to state their behavior of changing for time saving. Respondents could choose multiple options.

1. I would conduct this activity less frequent
2. I would spend less amount of time per episode of this activity
3. I would choose a faster transport mode
4. I would choose a closer location to conduct this activity
5. I would not change anything

After clicking option(s), respondents specify the exact amount of time that they want to save. This is done for each activity category.

Money saving scenario

We have summarized your data from the previous page where you indicated your expenditure and we calculated how much money you spend in total per month to each activity. We now ask you to imagine that you should save X Euro in total from the activity categories below. For example, you can think of a situation that your income decreased as a result of the economic crisis and you decided to save this decreased amount only from your leisure activities. Please specify how you would like to do this by clicking the options below. You can choose multiple options. You can also calculate by using the calculate button to check whether the sum of your savings are equal to X Euro.

The following choice options are included for respondents to state their behavior of changing for money saving. Respondents could choose multiple options.

1. I would conduct this activity less frequent
2. I would spend less amount of money per episode of this activity
3. I would choose a cheaper transport mode

4. I would choose a closer location to conduct this activity
5. I would not change anything

After clicking option(s), respondents specify the exact amount of money that they want to save. This is done for each activity category.

After respondents indicated how they would save and how much time and money they would save, they were asked how much of the given amounts of time and money they would save on their *out-of-home leisure activities* in real life given the stated changes in budgets (note: they could also save the resources in other categories of activities). This was asked for saving time by the following structure:

In the previous page, we asked you to imagine that you have to save Y minutes from your out-of-home leisure activities. Would you do this in reality too? Please indicate how much time in reality you would save from your out-of-home leisure activities if your working hours would increase Y minutes.

For saving money, they were asked:
In the previous page, we asked you to imagine that you have to save X Euros from your out-of-home leisure activities. Would you do this in reality too? Please indicate how much money in reality you would save from your out-of-home leisure activities if your income would decrease X Euros.

Sample Descriptives

The questionnaire was conducted in the Netherlands in June 2012 by sending the web link to a respondent panel of a research bureau in the Netherlands. The panel includes individuals from all over the Netherlands. As a result of the data collection, we obtained completed responses from 500 respondents and after cleaning the data 423 of them were useful for the analysis. The data is cleaned by omitting the responses including outliers and the inconsistent responses such as indicated frequency of an activity is zero however indicated duration is bigger than zero and vice versa.

Table 1 gives an overview of the key sample characteristics. The sample is fairly evenly distributed across gender classes where 50.4% of the sample is male while 49.6% of the sample is female. 32.4 % of the sample is between 18 and 35 years old, 31.9% of the sample is between 36 and 50 years old, 27.2% of the sample is between 51 and 65 years old. There are fewer respondents from the elderly category compared to the population (65 years and older). This might be due to the online survey, since older people are more difficult to be reached through internet. Moreover, regarding household composition, double household without children is the largest category and followed by single or double household with children, single without children and multiple person households. According to the monthly net income distribution, it is seen that between 1251 and 1875 Euro is the largest category, followed by 1876-2500 Euro, less than 625 Euro, 625-1250 Euro, 2501-3125 Euro and more than 3125 Euro. 302 respondents indicated that they have a partner and reported their partner's income category as well. A similar income distribution is also reported for partners. Furthermore, 40.1% of the sample works full time and 36.9% of the

sample works part time while 23% of the sample does not work. In addition, 59.1% of the sample spends between 500 and 1000 Euros to their dwellings. Finally, 58.6% of the sample has 2 cars in the household.

Table 1 - Sample Descriptive Statistics of Socio-demographic Characteristics

		Value	Percent (%)
Gender	Male	213	50.4
	Female	210	49.6
Age	18-35	137	32.4
	36-50	135	31.9
	51-65	115	27.2
	65+	35	8.3
Household Composition	Single, no children	68	16.0
	Double, no children	170	40.2
	Single or Double, with children	147	34.8
	Multiple Persons	38	9.0
Income	<625	85	20.1
	625-1250	78	18.4
	1251-1875	112	26.5
	1876-2500	88	20.8
	2501-3125	36	8.5
	3125+	24	5.7
Partners Income	<625	68	16.1
	625-1250	58	13.7
	1251-1875	82	19.4
	1876-2500	60	14.2
	2501-3124	18	4.3
	3125+	16	3.8
Working Hours	No work (0 hour)	97	23.0
	Part time work (1-32 hours)	156	36.9
	Full time work (>32hours)	170	40.1
Dwelling Expenditures	<500	70	16.5
	500-1000	250	59.1
	>1000	103	24.3
Nr of Auto in Household	1	47	11.1
	2	248	58.6
	3+	128	30.3

Table 2 shows the mean values of frequency, activity episode duration and expenditure, and expenditure per unit time for out-of-home leisure activities. The results indicate that outside recreation is the most frequently conducted activity in a month followed by sporting, going out, hobbies and courses, and cultural activities. Wellness, beauty and relaxation is the least frequently conducted activity. Moreover, mean episode duration is highest for attraction visit followed by going out, culture, outside recreation and event visit while it is lowest for wellness, beauty and relaxation. Furthermore, the results show that mean episode

expenditure is highest for going out followed by attraction visit, culture and event visit while it is lowest for sport event visit. Finally, table 2 reports the expenditure per unit time which is highest for going out and lowest for outside recreation activity.

Table 2 - Mean Values of Frequency, Activity Episode Duration, Activity Episode Expenditure, and Expenditure per Unit Time

Activity	Frequency in a month	Episode Duration (in minutes)	Episode Expenditure (in Euro's)	Expenditure per unit time (Euro/min)
Outside Recreation	5.78 (9.24)	73.70 (70.39)	5.06 (9.22)	0.069
Sport Event Visit	.57 (1.67)	31.49 (70.92)	3.89 (10.14)	0.124
Sporting	3.55 (5.31)	45.27 (71.62)	3.93 (10.13)	0.087
Wellness, Beauty and Relaxation	.20 (.58)	29.47 (96.49)	7.03 (20.29)	0.239
Attraction Visit	.52 (.87)	126.94 (190.64)	21.42 (37.37)	0.169
Event Visit	.48 (1.11)	62.86 (125.68)	10.14 (24.71)	0.161
Culture	1.00 (2.26)	76.11 (94.14)	15.71 (33.26)	0.206
Going Out	2.38 (3.07)	109.68 (113.54)	34.34 (44.21)	0.313
Hobbies, Courses and Others	1.43 (4.13)	43.80 (105.22)	5.11 (13.68)	0.117
p-value	1E-132	5.43E-62	2.5E-105	

Table 3 gives the mean values of one-way travel duration and expenditure for the out-of-home leisure activities. Travel expenditure is highest for attraction visit followed by going out, event visit, culture, outside recreation, sport event visit, hobbies and courses, wellness, beauty and relaxation, and finally sporting. Turning to duration, one-way travel duration is also highest for attraction visit, followed by going out, event visit, culture, outside recreation, sport event visit, hobbies and courses, sporting and finally wellness, beauty and relaxation.

Table 3 - Mean Values of One-way Travel Expenditure and Duration

Activity	One-way travel duration (in minutes)	One-way travel expenditure (in Euro's)
Outside Recreation	10.88 (19.06)	3.69 (24.77)
Sport Event Visit	7.84 (26.97)	2.00 (12.78)
Sporting	5.51 (10.847)	1.04 (3.96)
Wellness, Beauty and Relaxation	4.23 (12.83)	1.45 (6.24)
Attraction Visit	21.72 (37.77)	6.50 (11.04)
Event Visit	12.73 (26.95)	4.25 (10.71)
Culture	12.43 (18.57)	3.76 (8.04)
Going Out	13.48 (19.28)	4.31 (12.70)
Hobbies, Courses and Others	5.80 (15.81)	1.59 (6.57)
p-value	4.85E-38	1.89E-12

Table 4 - Savings of Money and Time

Activity	Mean Amounts of Savings		Relative Comparison of Savings to the Amounts to be Saved	
	Duration	Expenditure	Duration	Expenditure
Outside Recreation	159.17 (294.10)	15.18 (54.16)	0.228	0.117
Sport Event Visit	31.90 (119.56)	4.45 (14.96)	0.046	0.034
Sporting	109.55 (309.25)	11.95 (55.42)	0.157	0.092
Wellness, Beauty and Relaxation	15.62 (71.42)	4.05 (15.80)	0.022	0.031
Attraction Visit	78.62 (161.11)	16.70 (34.59)	0.113	0.129
Event Visit	51.17 (167.56)	9.86 (39.56)	0.073	0.076
Culture	70.67 (300.60)	16.17 (106.95)	0.101	0.125
Going Out	155.63 (310.44)	51.75 (145.22)	0.223	0.400
Hobbies, Courses and Others	60.72 (192.72)	6.58 (29.81)	0.087	0.050
p-value	6.55E-29	2.15E-26		

Reported Changes

For each respondent, the scenario states that 30% of the overall duration and expenditure are the amounts to be saved. The mean value of amount to be saved for money is 129 Euro (st. dev.=249.62), for time it is 696 min (st. dev.=686.16). The mean values of savings for time and money, and also relative comparison of savings to the amounts to be saved of each out-of-home leisure activity and travel are shown in Table 4.

The results show that respondents tend to save most time on outside recreation while they tend to save least time from wellness, beauty and relaxation activity. After outside recreation, respondents on average save most time in decreasing order on going out, sporting, attraction visit, culture, hobbies and courses, event visit, sport event visit, and wellness, beauty and relaxation activities. Furthermore, the results indicate that respondents tend to save most money on going out while they tend to save least money from wellness, beauty and relaxation activity. After going out, respondents tend to save most money in decreasing order on attraction visit, culture, outside recreation, sporting, event visit, hobbies and courses, sport event visit and wellness, beauty and relaxation activities. In addition, the relative comparison of savings to the amounts to be saved shows the mean percentages for each activity category. The results show that respondents tend to save most time relatively to the total amount to be saved from outside recreation followed by going out, sporting and attraction visit. The results also indicate that respondents tend to save most money relatively to the total amount to be saved from going out followed by attraction visit, culture and outside recreation.

SAVING TIME

A multinomial logit model is used to analyze the allocation of time savings across response options. The analysis includes the following explanatory variables (1) activity-specific variables (activity frequency, activity-episode duration, travel-episode duration), (2) individual-specific variables (gender, age, the number of persons in the household, number of autos in the household, working hours, income and total amount of time to be saved (stated by the scenario)) and (3) activity categories (outside recreation, sport event visit, sporting, wellness and beauty, attraction visit, event visit, culture, going out and other). Activity-specific variables are considered as main effects in the model. In addition to that, interactions between individual-level variables and activity categories and between activity-specific variables and activity categories are also considered in the model. Activity frequency, activity-episode duration and travel-episode duration in the existing situation are used as continuous variables while the other variables are coded as dummy variables. The dependent variable is the distribution of total amount saved across activity categories which is calculated by dividing the saved amount of time of an activity to the total amount to be saved for each respondent. Only the activities that respondents indicated to spend time in existing situation are included in the estimation.

Table 5 represents the estimation results. Only the significant variables are included in the model. The coefficients in the table indicate the effects of variables on the proportion of saving time. Estimates are obtained using NLOGIT version 4.0 (Greene, 2007). McFadden's Rho-square is found to be 0.129. Although constants for each activity category are added to the model, they are not found to be significant. This might indicate that there is no variation between activity categories.

Table 5 - Estimation result for the proportion of saving time

Variables	**B**	**Sig**
Frequency	0.140	0.000
Activity-Episode Duration	0.005	0.000
Travel-Episode Duration	0.007	0.017
Total Time Saving*Outside Recreation	0.001	0.001
Frequency*Outside Recreation	-0.088	0.000
Frequency*Going Out	0.072	0.040
Activity-Episode Duration*Attraction Visit	-0.008	0.042
Number of Observations	402	
Log likelihood Null	-468.9550	
Log likelihood Full	-538.3682	
McFadden Pseudo R-squared	0.129	

With respect to the main effects of activity-specific variables, it is found that activity frequency has a positive effect suggesting that with increasing frequency of an activity, the proportion of saving time increases. Moreover, it is found that the proportion of time saving increases with increasing activity-episode duration and travel-episode duration. This is a plausible effect because, in general, if more time is spent on an activity, the saving time for the activity will be higher.

Regarding the interaction effect between individual-level variables and activity categories, only total time saving and outside recreation interaction is found to be significant. This interaction is found to be positive which means the increasing amount of total time to be saved increases the proportion of saving time for outside recreation activity.

Considering the interaction effects between activity-specific variables and activity categories, frequency has a negative effect on the proportion of saving time for outside recreation while it has a positive effect on the proportion of saving time for going out. This indicates increasing frequency of outside recreation decreases the proportion of saving time for this activity while increasing frequency increases the proportion of saving time for going out. Finally, it is found that the increasing activity-episode duration lowers the proportion of saving time for attraction visit.

Table 6 - Estimation result for the probability of saving money

Variables	**B**	**Sig**
Attraction Visit	1.421	0.000
Event Visit	0.500	0.044
Going Out	0.530	0.024
Frequency	0.082	0.000
Activity-Episode Expenditure	0.026	0.000
Travel-Episode Expenditure	0.018	0.018
Full-Time Work*Going Out	-0.454	0.095
Frequency*Outside Recreation	-0.068	0.002
Frequency*Sport Event Visit	0.138	0.056
Frequency*Going Out	0.105	0.032
Activity-Episode Expenditure*Outside Recreation	0.051	0.000
Activity-Episode Expenditure*Attraction Visit	-0.017	0.000
Travel-Episode Expenditure*Sport	0.115	0.005
Number of Observations	400	
Log likelihood Null	-497.9073	
Log likelihood Full	-503.3377	
McFadden Pseudo R-squared	0.011	

SAVING MONEY

Adaptive behavior in terms of money saving was also examined using a multinomial logit model. The same set of variables was considered. Table 6 represents the estimation results. Again, only the significant variables are included in the model. The coefficients in the table indicate the effects of variables on the proportion of saving money. It should be noted that only the activities that respondents indicated to spend money in the existing situation are included in the estimation. Estimates are obtained by using the economic software NLOGIT version 4.0 (Greene, 2007). McFadden's Rho-square is found to be 0.011 which indicates that the explanatory power of the considered variables on the amount of money saving is

very low. Although the constants for each activity category are added to the model, they are not found to be significant which indicates there is no variation between activity categories.

Regarding the main effects, it is found that increasing frequency increases the proportion of saving money for out-of-home leisure activities. Moreover, activity-episode expenditure and travel-episode expenditure have both a positive effect on the proportion of saving money. This indicates that with increasing activity-episode expenditures and travel-episode expenditures, the proportion of saving money also increases. This is a plausible effect because, in general, if more money is spent on an activity, the proportion of saving money from that activity will be higher. Considering the interaction effects of individual-specific variables and activity categories, except the interaction between full-time working and going out activity, no significant effects are found. The interaction between full-time working and going out has a negative effect on the proportion of saving money. This result indicates that individuals who work full-time save less money from going out. The probable explanation can be that full-time workers earn more money compared to part-time workers, which is the baseline. Frequency has also an effect on money saving behavior at the activity category level. The interaction between outside recreation and frequency is found to be negative. This result shows that with increasing frequency of outside recreation, the proportion of saving money from that activity decreases. Furthermore, it is found that the interaction between frequency and sport event visit has a positive effect on the proportion of saving money. It is also found that the interaction between frequency and going out has a positive effect on the proportion of saving money. These results show that with increasing frequency the proportion of saving money for sport event visit and going out increases.

The interaction between activity-episode expenditure and outside recreation has a positive effect on the proportion of saving money while the interaction between activity-episode expenditure and attraction visit has a negative effect on it. These results indicate that with increasing expenditure of activity per episode, the proportion of saving money increases for outside recreation while it decreases for attraction visit. Finally, the results show that with increasing expenditure of travel per episode, the proportion of saving money increases for sporting.

SEGMENTATION OF SAVING BEHAVIOR

Very few interactions between individual-level variables and activity categories are found to be significant. In this section, a cluster analysis is conducted in order to group individuals with similar type of saving behavior. More specifically, the K-means clustering method is used to classify individuals on their responses to time respectively money savings for each activity category. The proportion of time saving for each respondent was calculated by dividing the saved amount of time for an activity to the total amount to be saved. This was done for each activity category. Figure 1 shows the ratio of the between-classes variance to the total variance of clustering for allocation of time savings. The marginal gain starts to decrease after the 7th cluster. Therefore, 7 clusters were identified.

Table 7 shows the cluster centers for each activity and also the number of observations for each cluster. It can be seen that individuals in Cluster 1 tend to save time mostly from sporting activity followed by outside recreation. Individuals in cluster 2 tend to

save time mostly from attraction visit activity followed by outside recreation. In Cluster 3, more variation is seen between activities. Individuals in that cluster tend to save time respectively from culture, event visit, going out and outside recreation. In Cluster 4 individuals tend to save mostly from outside recreation activity. In cluster 5 individuals tend to save time mostly from going out. In Cluster 6, individuals tend to save time mostly from other activities such as hobbies. Finally, in Cluster 7, individuals tend to save time mostly from sport event visit.

Cluster membership results for each respondent were used as the dependent variable in a multi-nomial logit analysis using socio-demographic characteristics as independent variables. Cluster 2 was used as the base category for this analysis. The results explain the membership effect of individual-level variables on the clusters. The estimation results are shown in Table 8.

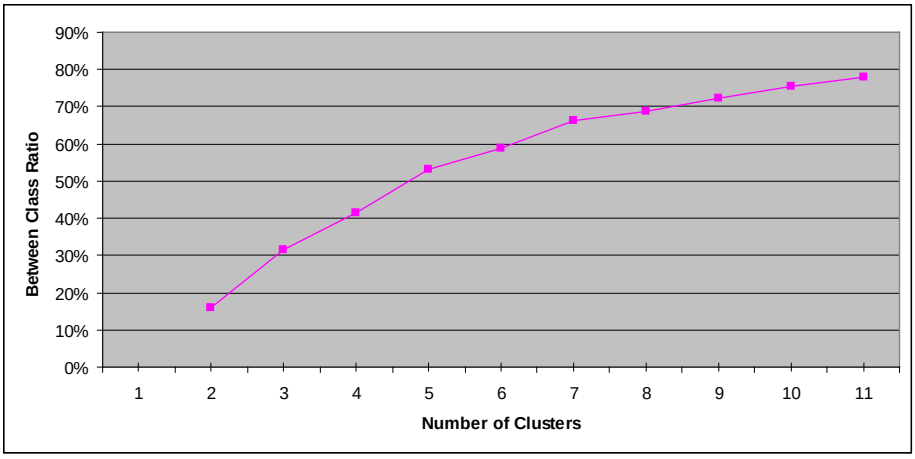

Figure 1 - The ratio of between-classes variance and number of clusters

Table 7 - Cluster centers for each activity category

Activities/Clusters	1	2	3	4	5	6	7
Outside recreation	0.130	0.103	0.146	0.796	0.095	0.074	0.118
Sport Event Visit	0.028	0.013	0.028	0.005	0.015	0.019	0.771
Sporting	0.639	0.053	0.045	0.015	0.056	0.025	0.030
Wellness	0.017	0.015	0.077	0.006	0.013	0.000	0.001
Attraction Visit	0.026	0.584	0.044	0.036	0.052	0.036	0.023
Event Visit	0.014	0.033	0.202	0.016	0.020	0.038	0.000
Culture	0.042	0.091	0.247	0.022	0.027	0.004	0.000
Going Out	0.069	0.090	0.159	0.087	0.704	0.042	0.026
Other	0.036	0.018	0.052	0.017	0.017	0.761	0.030
Observations	59	56	92	77	74	28	16

Results suggest that being female has a negative effect on the probability of belonging to Cluster 1. Moreover, increasing total amount of time to be saved has a positive effect on the probability of membership to this cluster. Regarding the membership of Cluster 3, increasing age has a positive effect on the probability of belonging to this cluster. Furthermore, no work has a negative effect on the membership of Cluster 3. Moreover,

increasing total amount of time to be saved has a positive effect on the probability of being membership of Cluster 3. Considering the membership of Cluster 4, increasing age has a positive effect. Furthermore, increasing number of persons in the household has a negative effect on the probability of belonging to this cluster. Finally, increasing number of autos is found to have a negative effect on the probability of membership of this cluster. With respect to Cluster 5, increasing age is found to have a positive effect on the probability of belonging to this cluster. Moreover, increasing number of persons in the household has a negative effect. It is found that no work has a negative effect on the probability of the membership of cluster 5. Regarding Cluster 6, it is found that t increasing age has a positive effect on the probability of membership to this cluster. Moreover, middle income is found to have a negative effect on the membership. Finally, considering Cluster 7, increasing age is found to have a positive effect on the probability of membership. In addition, increasing number of autos is found to have a negative effect on the probability of belonging to Cluster 7. The model has a relatively low R-squared (McFadden) of 0.064, which indicates that the explanatory power of individual-specific variables is only modest.

Table 8 - Estimation results for time saving clusters

	Cluster 1	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Intercept	0.503	-0.665	0.494	1.264	-2.512*	-1.119
Gender (base: Male)						
Female	-0.905**	0.148	-0.029	-0.514	0.206	0.01
Age	0.013	0.045**	0.052**	0.026*	0.058**	0.056**
Number of Persons	-0.097	-0.199	-0.335**	-0.329**	-0.077	0.227
Working Hours (base: Part-time)						
No work	0.139	-0.845*	-0.818	-1.52**	-1.13	-1.378
Full-time	-0.256	0.089	-0.121	-0.655	0.221	-0.389
Income (base: Low income)						
Middle Income	-0.15	-0.445	-0.424	-0.609	-1.038*	-0.773
High Income	0.241	-1.034	-0.977	-0.091	-0.508	-0.571
Number of Autos	-0.341	-0.168	-0.559**	-0.127	-0.101	-1.12**
Total Time Saving	0.001**	0.001*	0.000	0.000	0.001	0.000
Number of Observations	402					
Log likelihood Null	-1475.876					
Log likelihood Full	-1381.038					
Chi Squared	94.838					
McFadden Pseudo R-squared	0.064					

*Significant at .10 level, **significant at .05 level, ***significant at .01 level

A similar analysis was conducted on saving money. The proportion of money saving for each respondent was calculated by dividing the saved amount of money for an activity to the total amount to be saved for each activity category. In this case, 6 clusters were used identified because the marginal gain starts to decrease after the 6th cluster. Table 9 shows the cluster centers for probability of money saving of each activity and also the number of observations for each cluster. It is found that individuals in Cluster 1 tend to save money mostly from outside recreation. In Cluster 2, more variation is seen between activities. Individuals in that cluster tend to save money respectively from culture, event visit, going out and sport event visit. Individuals in cluster 3 tend to save money mostly from going out. In Cluster 4, most money is saved from attraction visit. In cluster 5 individuals tend to save money mostly from sporting. Finally, in Cluster 6, money is saved mostly from other activities such as hobbies.

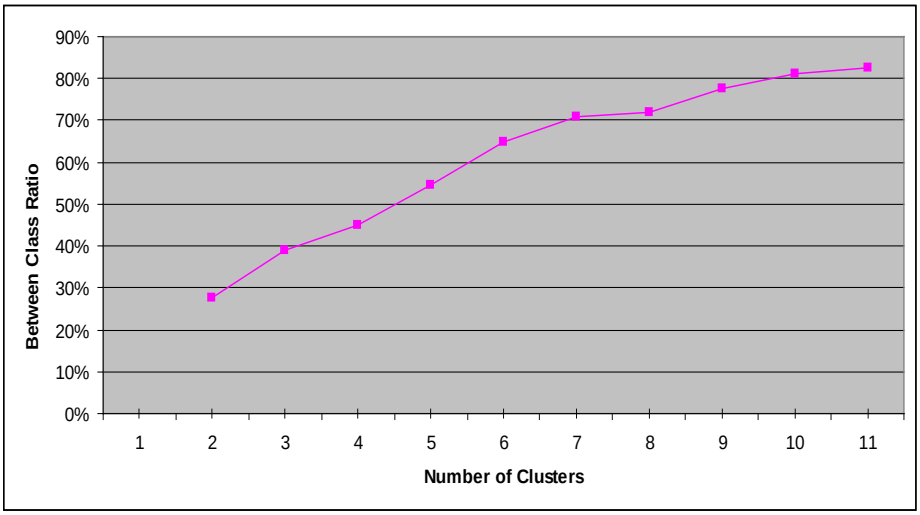

Figure 2 - The ratio of between-classes variance and number of clusters

Table 9 - Cluster centers of money saving for each activity category

Activities/Clusters	1	2	3	4	5	6
Outside Recreation	0.655	0.038	0.022	0.018	0.030	0.026
Sport Event Visit	0.039	0.108	0.012	0.032	0.013	0.002
Sporting	0.025	0.039	0.016	0.020	0.745	0.013
Wellness	0.026	0.096	0.009	0.020	0.007	0.005
Attraction Visit	0.041	0.088	0.038	0.774	0.058	0.032
Event Visit	0.036	0.218	0.024	0.012	0.021	0.040
Culture	0.034	0.243	0.024	0.032	0.043	0.006
Going Out	0.131	0.145	0.848	0.084	0.061	0.054
Other	0.013	0.025	0.008	0.008	0.023	0.791
Observations	58	110	126	51	34	21

Also in this case, a multinomial logit analysis was conducted to predict the probability of being a cluster member as a function of the selected socio-demographic variables. Cluster 4 was used as the base category for this analysis. The estimation results are shown in Table

10, which shows that increasing age has a positive effect on the probability of membership of Cluster 1. Regarding Cluster 2, being female has a positive effect on the probability of belonging to this cluster. Moreover, it is found that no work category has a negative effect on the probability of membership of Cluster 2. In addition, increasing amount of money to be saved has a positive effect on the probability of membership of Cluster 2. Considering Cluster 3, no-work category has a negative effect on it. In addition, increasing amount of money to be saved has a positive effect on probability of belonging to Cluster 3. Moreover, no significant effects of individual-specific variables are found for Cluster 5. Regarding Cluster 6, increasing age has a positive effect on the probability of membership. Full time working has a negative effect on the probability of membership. Finally, it is found that high income has a negative effect on the probability of belonging to Cluster 6. The model has a low R-squared (McFadden) of 0.050, which indicates that the explanatory power of individual-specific variables is low.

Table 10 - Estimation results for money saving clusters

	Cluster 1	Cluster 2	Cluster 3	Cluster 5	Cluster 6
Intercept	-1.675	0.222	0.589	-1.576	-3.540**
Gender (base: Male)					
Female	0.520	0.766*	-0.119	-0.204	0.256
Age	0.030**	0.013	0.021	0.010	0.063***
Number of persons	-0.149	-0.200	-0.168	-0.309	-0.024
Working Hours (base: Part-time)					
No work	-0.282	-0.961**	-0.906**	-0.040	0.023
Full-time	0.625	0.138	-0.496	0.183	1.307*
Income (base: Low income)					
Middle Income	0.180	0.427	0.021	0.853	-0.343
High Income	-1.057	-0.806	-0.261	0.249	-2.445**
Number of Autos	0.129	-0.037	0.032	0.347	-0.332
Total Money Saving	0.002	0.003*	0.003*	0.003	0.002
Number of Observations	400				
Log likelihood Null	-1297.830				
Log likelihood Full	-1232.522				
Chi Squared	65.308				
McFadden Pseudo R-squared	0.05				

*Significant at .10 level, **significant at .05 level, ***significant at .01 level

CONCLUSIONS AND DISCUSSION

This chapter analyzed the adapted changes for savings of individuals when their time and monetary budgets are constrained. The analyses are conducted by using two different analysis approaches and separately on adaptations of time saving and money saving. The

first analysis is done on the proportions of time and money savings. Constants are found to be insignificant which indicates that there is no variation between activity categories. Moreover, very few individual-specific variables are found to be significant in the analysis. The analysis indicated that activity-specific variables such as frequency, activity episode duration and travel episode duration have effect on the probability of savings of time. This result shows that the more time spent on an activity in the existing situation, the more time is saved when the time budget is constrained. The same holds for the money savings.

The second analysis looks at clusters of individuals according to the saving behavior of individuals. A multi-nomial logit analysis is applied to obtain socio-demographic effects on membership of the clustered activity categories. The low R-squared results for both time and money saving adaptations indicate that that the explanatory power of these variables is low.

The results of these analyses give information on the saving adaptations of individuals when there is a time or monetary budget constraint. Therefore, these results might be useful for a future study where the savings are included to an activity-based model.

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