EXPERIENCED AND EXPECTED HAPPINESS IN TRANSPORT MODE DECISION MAKING PROCESS

Amalia Polydoropoulou, University of the Aegean (polydor@aegean.gr)

Susana Limão, École Polithechinique Federal de Lausanne (susana.limao@epfl.ch)

André Duarte, Delft University of Technology (aduarte@civil.ist.utl.pt)

Camila Garcia, Instituto Superior Técnico (camilagarcia@civil.ist.utl.pt)

Nikos Litinas, University of the Aegean (nlit@aegean.gr)

ABSTRACT

Introduction of different dimensions in the individual decision process has been of increasing interest to behavioural economists. This work is a progress to previous research in which the happiness dimension was introduced along with the deeply investigated economic trade-offs in order to model mode choice behaviour. In the present work, happiness is disaggregated in two different concepts: Experienced and Expected Happiness. Experienced Happiness results from the influence of previous similar experience evaluation and individual's memory. Expected Happiness aggregates the influence of the predicting capability of an individual, the expectations, the motivations and the hidden beliefs in the decision process. These two concepts are integrated in a Mixed Multinomial Logit (MMNL) with panel data consideration that reveals interesting results, suggesting innovative approaches in order to better understand the transport users' mode choice behaviour. The main findings comprise the significance of Experienced and Expected Happiness in the transport mode decision process; and that these concepts are much more related to the choice of private car as opposed to the choice of public transport (metro). The conclusions arisen might contribute to a better understanding of the transport market demand, supporting the improvement of strategic decisions of policy makers.

Keywords: Mode Choice, Experienced Happiness, Expected Happiness, Panel Data, Stated Preferences and Mixed Multinomial Logit.

INTRODUCTION

It has been recently acknowledged the contribution of behavioural science in the economic field, and the new challenges on measuring and quantifying the motivations and perceptions that drive the consumers' motivation. In 1789, Jeremy Bentham introduced the concept of final 'utility' as human 'happiness' (Veenhoven, 2004), and this philosophy, known as

'Utilitarism' expresses happiness as both the presence of pleasure and absence of pain (Diener *et al.*, 2003), a concept brought from the roots of hedonism.

The transportation field is undoubtedly embed on daily choice making processes, and therefore plays an important role on the individual's life, contributing for its overall perception of life satisfaction. The evolution on both complexity and alternatives of choice proposed to individuals by transportation on one hand, and the economic, social, human and environmental dimensions and scales of transportation projects on the other hand, is a very strong argument to focus on target the reasoning behind transport mode choices. In this sense, importing the main findings of recent research on behavioural and economic sciences to the grounds of transportation research, the present work evaluates the impacts of happiness on bi-mode transportation decision-making process – private car and metro (public transport), centred on quantifying the impacts of stated and expected happiness, as two differentiated parts of the happiness. What is the impact of both stated and expected happiness on the transport mode decision process was the question addressed, and for this study two types of trip purpose were explored - work and leisure.

This paper is structured in six sections. The present section introduces the work explored in this paper. Section two briefly discusses the concepts of happiness and well-being and brings some insights within happiness ground and transportation field. Section three describes the behavioural framework and the methodological approach. In section four, the data collection methodology is presented, followed by the model estimations and main results in section five. The final section presents the most important conclusions and recommendations for further research.

STATE OF THE ART

Starting in the 1960's, empirical research on happiness has developed in many branches of the social sciences (Veenhoven, 2004), introducing subjective indicators in addition to traditional objective ones, and positioning happiness as the main indicator of social system performance. On the ground of human happiness studies the concept of well-being is often used to denote an optimal sum of psychological experience and functioning essentially due to focus on subjective well-being explored on the work of psychologists such as Diener (Deci and Ryan, 2003). Presently, the concept of happiness is frequently used for a person's life short-lived state, while in the past philosophers encompass the concept within a life time, and the notion of what makes life good for the individual is more closely related to the definition of 'well-being' rather than 'happiness'. Nevertheless, the term 'happiness' is still acknowledged by the different study fields as possessing different meanings and very often mixed up with the notion of 'well-being', which gives the concept a reputation for being elusive (Veenhoven, 2004).

The aim to use empirical methods to answer questions like - "What is happiness? Can it be measured? What causes happiness?" has been targeted since the 20th century by psychologists and other fields' scientists (Diener *et al.*, 2003). To date, the study of subjective well-being (SWB), human strengths and positive psychology has substantially

increased, contributing for the development of strong theoretical frameworks and rigorous methodology, and the proliferation of new measures and clear definitions (Duarte *et al.*, 2008). The Experience Sampling Method (ESM), also known by the names of time sampling, beeper studies and Ecological Momentary Assessment (EMA), during which the participants fill out a questionnaire several times a day (Diener, 2000), and the Day Reconstruction Method (DRM), which seems to be a more practical method to measure SWB (Kahneman *et al., 2004*), are part of a set of recent methods that attempt to measure happiness.

Economists have had a long-standing inclination for studying people revealed preferences, which means taking into account individuals' actual choices rather than their stated intentions or subjective reports about their preferences. However, people do often make choices that are highly embed with their own sense of happiness or well-being (Kahneman and Krueger, 2006). More recently, studies in neurology field suggest that, besides the evaluation of consequences and their related probability of occurring people make judgements based also and even sometimes at a primarily visceral or emotional level (Bechara, 2004), which supports the opening ground of cognitive psychology to isolate the causal foundations of economic choice behaviour (McFadden, 2005).

The transportation field has been a prolific yard of experimentation focused on the understanding of human behaviour, as worded by McFadden (McFadden, 2007): "Transportation is affected by human behaviour through its consumers (drivers, riders, vehicle buyers, and shippers); through its managers and workers; and through the policy-makers and voters who determine transportation infrastructure and policy.". The behavioural approach introduced in the transport mode choice models has opened space for the introduction of the happiness thematic in transportation along with the impact of travel happiness in the overall well-being perceived by individuals. Recent work on exploring the interrelationship between transportation and happiness, based on a cross-sectional travel and activity well-being survey, conducted with a sample of commuters in the summer of 2007, highlighted two major findings: first, commute satisfaction was found to be related to commute stress, social comparison, personality, and overall well-being; second, happiness experienced from performing an activity was found to be related to the propensity of activity participation (Abou-Zeid, 2008; Ben-Akiva and Abou-Zeid, 2007; Ben-Akiva, 2007).

The above referred suggests an innovative field of research involving transportation and happiness, that will adopt and enfold several methodologies and findings from psychology, neuroscience and economics, adjusting and extending them within the transport domain. This research is particularly focused in developing advanced demand models that mirror the impacts of happiness in mode choice travel behaviour.

The following sections comprise the behavioural framework, data collection and modelling methodology adopted to accomplish the above mentioned objectives.

BEHAVIOURAL FRAMEWORK

The definition of 'happiness' and 'well-being' comprises the first requirement of the methodology development. Nonetheless, as described in Section 2, happiness and well-being conceptualization imply a personal individual and emotionally related evaluation, and so, it is unrealistic to state a global and unique definition for both concepts. Approaching the concept of happiness as a personal positive reaction to a certain environment or system in a certain time frame, the perceived happiness depends on both the environment considered and the different personal points of view among individuals. On the other hand, well-being can be assumed as the perceived evaluation of the overall life environment or system. By reducing the domain of this evaluation to each one's life sub-system, happiness and well-being can be seen as depicted by Figure 1.

Moreover, the distinction between well-being and individual happiness, two latent concepts are differentiated within the proposed happiness framework: Experienced and Expected Happiness. The memory of a previous experience, choice or environment is an important factor influencing the decision process towards a similar future experience or choice process. This latent happiness assessment and evaluation is, from now on, referred as Experienced Happiness.
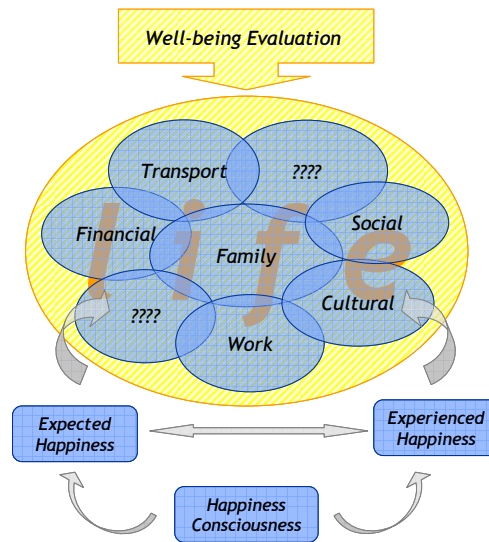

FIGURE 1 Well-being Evaluation and Happiness Access.

However, human beings have also the ability to create predictions based on possible future scenarios. In this sense, Expected Happiness is considered as a result of the assessment of individual expectations, attitudes and evaluation during a decision process. This happiness component might enable an individual to better face an innovative future experience, in comparison with a previous one, as he can benefit from technology improvements, update of a service, etc.

These two latent concepts interact and are expected to have different type of dynamic correlations within the decision choice process. One's Expected Happiness is certainly correlated with the one's previous Experienced Happiness within a similar situation. In

addition there is a dynamic effect in similar consecutive decision processes. While experiencing a decision, a new Experienced Happiness is constructed, which also depends on the previous expectations. This new Experienced Happiness will influence the next similar decision process. Therefore, a dynamic relationship between these two latent concepts is expected to help understanding the decision process of an individual. This structure illustrated by Figure 2 was inspired in the behavioural choice model framework suggested by McFadden (2005) and Ben-Akiva *et al.* (1999).
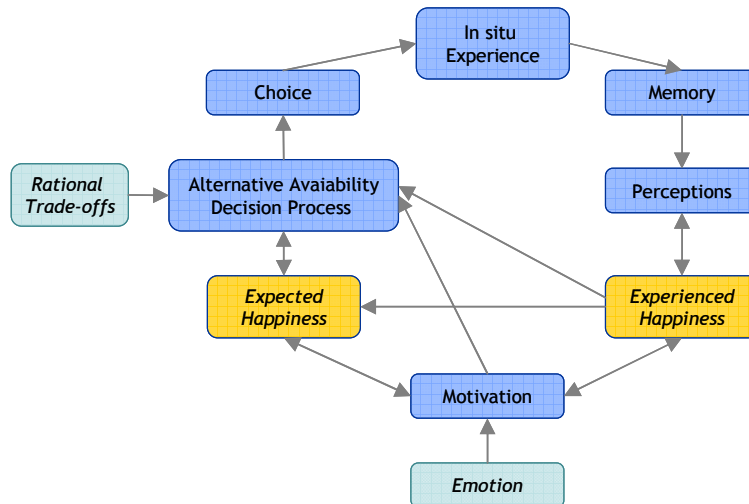

FIGURE 2 Behavioural Choice Model.

DATA COLLECTION METHODOLOGY

An on-line survey developed for understanding the relationship between mode choice behaviour and happiness (see also Duarte *et al.*, 2008), was used to collect the data for further analysis and model calibration. The survey was built in *php* language and *MySql* was used for the database development.

Survey Design

The web survey was composed of three parts: the first one intended to capture the behaviour of different social groups through the respondents' social and demographic characteristics; the second comprised a set of questions intended to capture the respondents' happiness in different life domains; the final part, focused on the individuals' travel choice, where they stated their preference for a presented travel option. Car and metro alternatives were described by different scenarios in which: travel cost; travel time; waiting time; and parking search time for car and waiting time for metro were varying.

The experienced happiness questions included on this survey are one of the innovative breakthroughs of this work. Data collection on individual's experienced happiness comprised two questions regarding the transportation field for the two trip purposes addressed in this case study: How happy do you feel by using your current mode of transport to make a work

related trip?; and How happy do you feel by using your current mode of transport to make a leisure trip?.

One other innovative instrument of the survey held is the use of cartoons to help the individuals make their choices. Different transport alternatives were presented to respondents and they were asked to make eight different transport mode choices between metro and private car for a specific trip purpose. In each conducted choice experiment a cartoon was presented as a form of transmitting/suggesting the travel conditions and expected travel environment. Three different cartoons were drawn for each transport mode, representing: high satisfaction; average satisfaction; and low satisfaction, as shown in Figure 3.
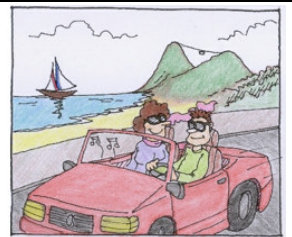
Satisfaction Level	Low	Average	High
Private Car			
Metro			

FIGURE 3 Cartoons' Design (originals depicted by Arq. Tiago Veras)

Descriptive Statistics

The on-line questionnaire remained available for six days, during November and December 2007 at *www.civil.ist.utl.pt/~aduarte*, and received the total of 1,342 entries. Of this total, around 80% of responses were used to analyse the social-demographic characteristics and the stated happiness of the individuals as several of them did not answer all questions. The model estimations considered 65% of total responses, corresponding to complete answered questionnaires.

According to the social-demographic answers most of the respondents are from Switzerland, Portugal, Greece and Italy, but responses were also received from other countries, such as Brazil. The age range of the majority of the respondents is between 20 and 34 years old and their average monthly household income is 3,500€, with a household average size of 2.6 members. Most of the respondents live and work in urban areas, among which 2/3 is employed people and 1/3 are students. The most used transport modes for work trips are

private car and metro. Considering car ownership, 2/3 of the respondents own a car and 1/3 do not have a car.

Stated Happiness Statistics

In order to apprehend the respondent's happiness in different life domains, a set of eight questions composed the second part of the survey developed. The first question target the overall well-being of the individual; the second, third and fourth are questions regarding happiness within key domains of a person's life; the fifth and sixth questions intend to capture the stated happiness with respect to transportation field, focusing on the two trip purposes addressed in this case study; and the last two questions aim to quantify the perception of how important is happiness while a person is travelling, for the two trip purposes. For this purpose a 1 to 10 numeric scale was used as the response ranking; developing from 1 the least happy/unsatisfied to 10 the most happy/satisfied level.

Table 1 presents the average rank of each one of the eight questions, and also the standard deviation occurred. As it is shown, the average rank on stated happiness questions is around Level 7, with a lower value of question four, focused on the financial situation; and the higher value on ranking the importance of happiness during a leisure trip. The standard deviation of the set of stated happiness query from the average answer to the respective question is around 1.96, with the lower deviation on the first question, focused on the overall happiness; and the higher on the sixth question, targeting the happiness level with the current transport mode used on a leisure trip.

TABLE 1 Stated Happiness Statistics

Stated Happiness Questions (Happy Survey – Part 2 available at *http://www.civil.ist.utl.pt/~aduarte/StatedHappy.php*)	*Average*	*Standard Deviation*
1) How happy do you consider yourself, in an overall perspective?	7.46	**1.48**
2) How happy do you feel with your family life?	7.62	1.96
3) How happy do you feel with your social life?	7.10	1.88
4) How happy do you feel with your financial situation?	**6.60**	2.16
5) How happy do you feel by using your current mode of transport to make a work related trip?	7.25	2.32
6) How happy do you feel by using your current mode of transport to make a leisure trip?	7.27	**2.37**
7) How important is for you to feel happy / satisfied during a work related trip? [*]	7.57	1.93
8) How important is for you to feel happy / satisfied during a leisure trip? [*]	**8.69**	1.54

Notes: In all the questions Level - 0 was considered the most unhappy/unsatisfied level and Level - 10 the highest happy / satisfied level. [*] Level - 0 was considered as the least important and Level - 10 the most important.

One of the main findings from the survey's stated happiness questions show that the overall happiness level significantly varies for each country. An overall perspective demonstrates that the most satisfied respondents are non Europeans, especially the Brazilians. In Europe, the most satisfied are the Swiss respondents and the least happy are the Portuguese and Italians.

Stated Happiness and Mode Choice

Regarding the stated happiness with the current transport mode used in work related trips, the happiest are the Swiss and the least happy are the Portuguese and Brazilians. Concerning the happiness related with the current transport mode used in leisure trips, the more satisfied are the Swiss, Greeks and Brazilians, and the less satisfied are the Portuguese and Italians.

Car ownership can also be a determining factor of the level of happiness; however, a linkage between car ownership and the level of overall happiness cannot be supported, as shown in Figure 4. Most respondents are car owners (see Figure 5) and are happier with their leisure trips rather than with their work related ones'. The opposite can be noticed in the responses from people who are not car owners, they are happier with their work related trips than with their leisure trips.
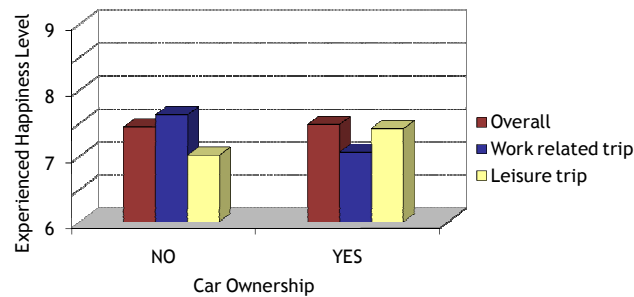

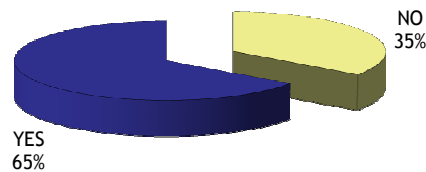**FIGURE 4 Happiness Level versus Car Ownership.**

FIGURE 5 Car Ownership.

One other factor that may influence people's happiness in their work related trips is the transport mode used to perform it. The respondents that use non-motorized modes, such as walking and cycling, to travel to work are more satisfied than those who use motorized modes such as car and bus, as shown in Figure 6. Notwithstanding, the non-motorized modes are the less used by the respondents (see Figure 7). Another finding is related to public transport users, particularly metro and train users are more satisfied with their work related trips than car users. Public transport ranks the second most used mode by respondents.
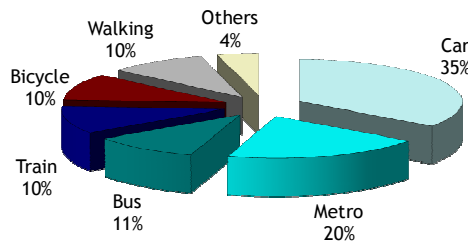

FIGURE 6 Work related Trips versus Transport Mode used.

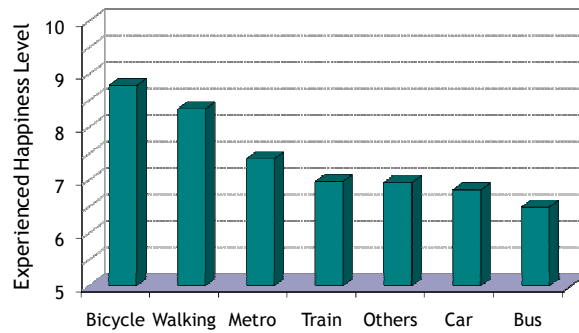*12th WCTR, July 11-15, 2010 – Lisbon, Portugal*

FIGURE 7 Transport Mode used for Work Trips.

Although the data collected come from a convenient sample, the goal of the survey i.e. capturing and modelling the socio-economic and attitudinal influences on the transport mode decision choice was well achieved.

MODEL DEVELOPMENT AND ESTIMATION RESULTS

Following the assessment of transportation happiness significance on the decision making process of an individual (*4*) it is now aimed to answer the following questions:
- Does previous experienced happiness influences the decision process for future similar experiences?
- Is the weight of the experienced happiness in the decision process independent of the type of experience?

Behavioural Mode Choice Model

Subsequently a discrete choice model estimation is presented, which includes the latent concepts of: Experienced Happiness, captured by the stated happiness questions; and Expected Happiness, translated by the use of the cartoons. Figure 8 summarizes the overall mode choice model structure, developed in this study, which is able to address all of the above mentioned questions.
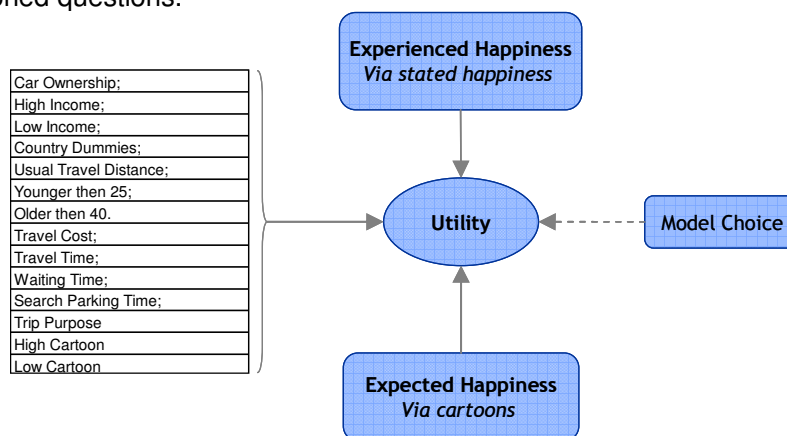

FIGURE 8 Mode Choice Model Structure.

The modelling estimations used state-of-the-art Random Utility Model techniques, accounting for Panel Data variables and Mixed Logit with Taste variation. All the model calibrations were completed using the *Biogeme* software developed by Prof. Michel Bierlaire from the Transport and Mobility Laboratory at EPFL, Lausanne (available at - *http://transp-or.epfl.ch/page63023.html*) and the results are presented in Table 2.

TABLE 2 Estimation Results

	Model 1	*Model 2*	*Model 3*
Results	***All Trips***	***Work Trips***	***Leisure Trips***
Rho-square	0.301	0.334	0.261
Initial Log Likelihood	-2,412.152	-1,206.076	-1,206.076
Final Log Likelihood	-1,685.397	-803.079	-891.515
Interations	21	56	20
Run time	3:41	14:01	16:14
Number of parameters	25	24	24
Number of observations	3,480	1,740	1,740
Number individuals	870	870	870
Value of time metro	22.8	22.0	23.1
Value of time car	27,1	34,5	21,9
Coefficients	***Value (T-test)***	***Value (T-test)***	***Value (T-test)***
CONST	-2.13 (-7.76)	-2.43 (-5.65)	-1.50 (-3.39)
COSTC – Cost for car trips	-0.109 (-7.34)	-0.0881 (-3.71)	-0.161 (-5.64)
COSTM –Cost for metro trips	-0.176 (-6.74)	-0.195 (-4.72)	-0.205 (-4.31)
TIME1C - Real travel time for car trip	-0.0493 (-10.95)	-0.0506 (-6.73)	-0.0587 (-6.50)
TIME1M - Real travel time for metro trip	-0.0670 (-14.05)	-0.0725 (-8.41)	-0.0791 (-7.95)
TIME2C - Parking time	-0.0839 (-5.84)	-0.0841 (-3.68)	-0.112 (-4.17)
TIME2M - Waiting time	-0.0663 (-6.08)	-0.0631 (-3.49)	-0.0910 (-4.54)
Trip Purpose			
LEISU - Dummy for Leisure trips	0.814 (7.67)		
Cartoons			
CHIGHC - High Expected Happiness in Car	1.38 (9.76)	1.55 (6.46)	1.67 (5.82)
CHIGHM - High Expected Happiness in Metro	0.610 (4.43)	0.657 (2.99)	0.79 (3.16)
CLOWC - Low Expected Happiness in Car	-1.50 (-9.79)	-1.88 (-6.57)	-1.51 (-5.49)
CLOWM - Low Expected Happiness in Metro	-0.118 (-0.91)	-0.092 (-0.43)	-0.135 (-0.60)
Social Demographic			
AGE25 - Individual younger than 25 years old	-0.0282 (-0.20)	0.0824 (0.39)	-0.061 (-0.72)
AGE40 - Individual older than 40 years old	0.311 (2.07)	0.647 (2.90)	-0.0153 (-0.06)
DISTLIV - Not living and working in the same place	-0.104 (-0.74)	-0.137 (-0.71)	-0.0875 (-0.40)
GR – Dummy for Greeks	0.795 (3.38)	0.573 (1.80)	1.19 (3.13)
OTHERC - Dummy for individuals from other countries	0.647 (2.93)	1.09 (3.49)	0.385 (1.11)
PT – Dummy for Portugueses	0.668 (3.69)	0.618 (2.46)	0.909 (3.06)
HIGHINC - Income higher than 8500€	0.0444 (0.23)	0.197 (0.74)	-0.0468 (-0.15)
LOWINC - Income lower than 2000€	-0.0598 (-0.38)	0.0561 (0.26)	-0.0899 (-0.37)
Experienced Happiness			
EHC - Experienced Happiness with car	0.147 (-7.13)	0.156 (-5.25)	0.165 (-4.56)
EHM - Experienced Happiness with metro	-0.0130 (0.53)	-0.0311 (0.94)	0.00325 (-0.08)
Standart Deviation			
σ Panel - Panel Data Sigma Distribution (mean zero)	1.37 (12.69)	1.47 (6.19)	2.01 (7.16)
σ EHC - Normal distribution on EH Car coefficient	0.105 (-2.45)	0.168 (-2.41)	0.201 (-2.85)
σ EHM - Normal distribution on EH Metro coefficient	0.0790 (-1.48)	0.0292 (-0.21)	0.0902 (0.66)

The above table presents three models: the first one includes all the sample data; the second one refers to work trips; and the third one to leisure trips. The constant is included in the metro utility function; therefore, the models show an *a priori* preference to the private car. Main mode attributes, such as travel costs, travel times, parking search time (for car) and waiting time (for metro) are very significant and with negative signs as expected. The

coefficient sign of the trip purpose variable shows that people prefer to use the private car when making leisure trips.

Expected happiness is captured through the introduction of the cartoons in the decision process. The High Satisfaction cartoons have a positive effect in the chosen alternative and the Low Satisfaction cartoons a negative effect. The low satisfaction cartoon for the metro is not significant, and this might be explained by the fact that this cartoon does not transmit a realistic image of a negative environment; thus, its low significance on the choice behaviour. These results show that expected happiness play a significant role on the decision making of individuals when choosing a transport mode.

The demographic coefficients provide some interesting results (although not all variables included in the model are statistically significant but are left in the model for comparison purposes). Individuals of more than 40 years old choose mainly the metro, and the individuals younger than 25 years prefer the private car. Location of residence with respect to location of work does not affect the chosen mode. Dummy variables of the respondents' countries of origin are very significant. Whereas the Swiss represent the main group of respondents, these dummies state the different behaviours in relation to them. It can be said that Greeks, Portuguese and all the other respondents, in general, have a higher preference for choosing the private car than the Swiss respondents. On the other hand, income does not seem to affect the chosen alternative. These results might be slightly biased, as income can be correlated with the home country of the respondent.

An interesting result emerges from the different significance of the Experienced Happiness related to both private car and metro, as this variable is very significant in the private car context, but not in the metro case. This suggests that the individuals have a much higher emotional relation with the private car than with the metro. Looking at the taste variation on the Experienced Happiness' coefficient, it is possible to reinforce the latter idea, as the normal distribution assumes the same relation: significant for private car related decisions and not significant for metro related decisions. This also suggests that the intensity of the emotional relation with the private car is normally distributed along the population, so it differs from individual to individual.

Analysing the different models estimations' by trip purpose reveals more accuracy for work related trips when compared to leisure trips. This may indicate that individuals have more complex decision processes when facing a leisure trip. On the other hand, the resultant values of time are also interesting, as there is a significant difference between values of time for using private car in work and leisure related trips. The value of time when using metro remains similar, independent of the trip purpose.

It should be noted that initial model estimations, without taking into account the effects of repeated observations from the same individual in various stated preferences scenarios (panel data) and the effects of experienced happiness, were presented in Duarte *et al.* (2008). A significant result of the model estimations presented in this paper is the improvement in overall goodness of fit, compared to the results previously obtained, mainly

due to the inclusion of a panel data variable, which incorporates the fact that the same respondent performs eight different experiments. In addition, incorporating the experienced happiness variable significantly improves the model fit.

CONCLUSIONS

Recent studies on happiness in economic, social, and neuroscience fields demonstrated very interesting achievements, encouraging the introduction of a wider perspective in the field of transportation research as well. Including the effect of happiness in transportation models stimulate new approaches towards the understanding of the decision process of transport users.

Transportation plays an important role on the establishment and development of modern economies and has a significant impact on individuals' happiness. Preliminary results of this project revealed the stated happiness concept as a consistent indicator of the decision choice process and that non-quantifiable attributes (such as expected happiness represented by cartoons) returned consistent effects on the model calibration. The estimation of such models was achieved using innovative data collection methods through enhanced stated preferences' experiments introducing cartoons as attributes of the choice process.

Following the adoption of a different framework for the decision process of a transport mode, alternative discrete choice model structures have been investigated. Desegregating the happiness concept in Experienced and Expected Happiness resulted in a robust structure, extending previous established frameworks.

An important finding is related to the fact that individual happiness' significance and impact on the decision process is highly related to the alternative mode. The different happiness concepts explored are highly attached to the private car as opposed to the metro, as people tend to relate more to the hedonic characteristics of car use such as freedom, status, feeling of possession, personal time and pleasure.

It is widely acknowledged that in depth understanding of market behaviour is extremely important for policy making. This work aims at contributing on the development of this knowledge, specifically with respect to transport related demand; it does not aim to be a predictive or scenario evaluation tool. Further work will involve the estimation of an integrated discrete choice and latent variable model enabling the application of this model in future scenario evaluation, avoiding the need of new measurements of the latent variables' indicators. The present work contributes to the understanding of the different relationships between individual decision making behaviour and available alternative choices by adding innovative dimensions of Happiness and Economics.

REFERENCES

Veenhoven, R. (2004) The Greatest Happiness Principle: Happiness as an Aim in Public Policy, *in Positive Psychology in Practice*, A. Linely and S. Joseph (ed.), John Wiley and Sons Inc., Hoboken, NJ, USA.

Diener, E., Scollon, C. N. and Lucas, R. E. (2003) The Evolving Concept of Subjective Well-being: The Multifaceted Nature of Happiness. *Advances in Cell Aging and Gerontology*, 15, 187-219.

Deci, E. L. and Ryan, R. M. (2008) Hedonia, Eudaimonia, and Well-being: an Introduction. *Journal of Happiness Studies*, 9 (1), 1-11.

Duarte, A., Garcia, C., Giannarakis, G., Limão, S., Polydoropoulou, A., and Litinas, N.(2009) "New Approaches in Transportation Planning: Happiness and Transport Economics", NETNOMICS: Economic Research and Electronic Networking, Special Issue on 'Design and Evaluation of Transportation Networks', DOI:10.1007/s11066-009-9037-2.

Diener, E., (2000) Subjective Well-being: The Science of Happiness and a Proposal for a National Index. *American Psychologist*, 55 (1), 34-43.

Kahneman, D., Krueger, A. B., Schkade, D. A., Schwarz, N. and Stone, A. A. (2004) A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method. *Science*, 306 (5702), 1776-1780.

Kahneman, D. and Krueger, A. B. (2006) Developments in the Measurement of Subjective Well-being. *Journal of Economic Perspectives*, 20 (1), 3-24.

Bechara, A. (2004) The Role of Emotion in Decision-making: Evidence from Neurological Patients with Orbitofrontal Damage. *Brain and Cognition*, 55 (1), 30.

McFadden, D. (2005) The New Science of Pleasure – Consumer Behaviour and the Measurement of Well-being. Frisch Lecture, Econometric Society World Congress.

McFadden, D. (2007) The Behavioral Science of Transportation. *Transport Policy*, 14 (4), 269-274.

Abou-Zeid, M. (2008) Exploration of Travel Well-Being in Static and Dynamic Contexts. Presented at the Fourth Annual Transportation Student Research Symposium, Boston, USA.

Ben-Akiva, M. and Abou-Zeid, M. (2007) Happiness and the Dynamic Hybrid Choice Model. Presented at the Frontiers of Transportation: Social Interactions, Amsterdam, Netherlands.

Ben-Akiva, M. (2007) Happiness and Activity-Based Models - Key Note Speech. Presented at the European Transport Conference, Leeuwenhorst, Netherlands.

Ben-Akiva, M., McFadden, D., Gärling, T., Gopinath, D., Walker, J., Bolduc, D., Börsch-Supan, A., Delquié, P., Larichev, O., Morikawa, T., Polydoropoulou, A. and Rao, V., (1999) Extended Framework for Modeling Choice Behavior. *Marketing Letters*, 10 (3), 187-203.