Quantifying the Benefits to Internet Users Derived from Online Applications

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Abstract

The objective of this study is to estimate the benefit from using the Internet and its applications available online. With a flat-rate scheme that is common under the broadband access (FTTH, DSL, CATV, etc.) in Japan, it is difficult to measure consumer surplus with traditional economic methodology as a usage-sensitive market price does not exist. Internet users can enjoy online applications as many/much as they want. In this situation, subscribing and using the Internet means that Internet users buy a bundled commodity at a certain fixed price for .the services they want, which are included in the package. In this study, we tried to unbundle the composite commodity (i.e. Internet service as a whole) into the applications available on the Internet and measured the Willingness to Pay (WTP) for those applications.

We applied a Stated Preference (SP) method for analyzing data and used a Random Parameter Logit Model for estimating WTP for each of such applications as emailing, web browsing and content downloading. The estimated WTP for availability of e-mail and web browsing over PC are ¥ 3,567 and ¥ 8,598 respectively while average broadband access service costs approximately ¥ 4,000 in Japan.

Keywords: Broadband, Stated Preference, Choice Probability, Random Parameter Logit Model, Consumer Surplus, Willingness to Pay (WTP)

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1. Introduction

Since commercial Internet access service was introduced in 1994, the penetration rate of Internet users had risen to 68.5% by 2006 in Japan and more than 87million people are viewed as users of the Internet[4]. In the process of expanding the number of Internet users, both network infrastructure and availability of online applications have been developed very rapidly. And in the present broadband access environment, people can enjoy a wide variety of online applications over the Internet ranging from e-mail to video programs[5]. With respect to broadband network services such as FTTH, DSL, CATV and FWA, the number of broadband service subscribers had catapulted to more than 26 million households by March, 2007[6]. With the broadband service, it is common to apply a flat-rate for access to the Internet and users are not required to pay any additional fees for the many online applications and services once they have paid the flat-rate. Those applications and services include e-mail, web browsing, word processing, spreadsheet, etc.

While people use these online applications and services at no additional cost, they do anticipate obtaining certain benefits from these applications and services. In other words, the benefits that users enjoy by accessing the Internet do not come from line access per se which they pay for but from online applications that are generally supplied for free. At the same time, attributes such as e-mail or web browsing are not provided as an unbundled service and it is difficult to derive their value from a Revealed Preference (RP) data[7]. In these circumstances, it is difficult to measure consumer surplus with an ordinary economic approach as there is no usage-sensitive market price for each of the online applications. Thus, few studies have been conducted to measure consumers' surplus for these online applications. One approach to deal with this matter could be an idea to introduce opportunity cost, i.e. cost of time. However, this method has a problem because it does not take the difference in the characteristics of online applications into consideration and treats them as identical as long as the time spent for these services is the same.

Alternatively, we will estimate consumers' surplus derived from the Internet usage and online applications by applying a stated preference method. We shall adopt a conjoint method to deal with the stated preference in which we systematically vary combinations of levels of each attribute such as availability of e-mail, web browsing and downloading content (music and/or video).

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[4] White Paper, Ministry of Internal Affairs and Communications, Japan

[5] The volume of traffic data of broadband users has also expanded rapidly from 269.4 Gigabits per second (Gbps) in September, 2004 to 636.6Gbps in November, 2006. (Data from six main ISP in Japan)

[6] The number of broadband subscribers was 3.9 million in March 2002, 9.4 million in 2003, 15.0 million in 2004, 19.6 million in 2005, 23.3 million in 2006 and 26.4 in March 2007. (Ministry of Internal Affairs and Communications)

[7] In many cases, only available data as RP is internet access line fee.

2. Data

2.1 Stated Preference

Considering that there is no market price for many online applications, it is thought to be appropriate to use a Stated Preference (SP) method which can apply even to the measurement of consumer benefits of nonexistent goods[8]. The method for surveying SP data can assume difference forms, including the pairs-comparison method, rank-order method, and choice-based method. Each method translates the nature of the commodity into a set of attributes and makes virtual commodities to control the levels of the attributes. This method is based on the multi-attribute approach originally proposed by Lancaster (1966) which regards the utility of consumption to be dependent not on the consumption of the commodity itself but on the consumption of the attributes of the commodity. As it is recommended that the number of attributes should be restricted to as few as possible, preferably less than seven, to avoid confusing the respondents[9], we selected the six attributes listed in Table 1 that we considered to be the most influential in the consumer's choice of Internet usage.

2.2 Conjoint Analysis

Conjoint analysis, which is one of the stated preference methods, has been applied in many study areas. Hensher (2001), for example, applied this method to automobile travel evaluation. Layton (2000) used this technique in environment research. Marketing is one of the most popular research areas for conjoint analysis (Huber and Trainn 2001). In the conjoint analysis, researchers firstly make hypothetical bundles of several attributes describing the characteristics of a commodity or a service, and then ask respondents to state their preferences for some hypothetical alternatives selected from the full set of combinations of alternatives. A statistical technique is applied to the responses in order to analyze the relative importance of the attributes.

Since this study aims to measure WTP for each attribute such as availability of e-mail and web browsing, respondents are asked whether or not to choose one of the packaged alternatives bundling either one level of monthly charges, access line speed, availability of e-mail etc., in addition to the question asking the option not to subscribe to the Internet. Details of the attributes and their levels shown in table 1 are as follows:

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[8] the common criticism of the SP method is the hypothetical nature of the questions and respondents' choice.

[9] Huber et al. (1991) recommends that the number of attributes should be restricted to about six.

Table 1: design of the conjoint analysis

		Levels					
		1	2	3	4	5	6
Attributes	Monthly charges	¥100	¥500	¥2,500	¥5,000	¥10,000	¥20,000
	Terminal devices	PC & mobile	PC only	mobile only			
	Access speeds	10M bps	1 M bps	128k bps			
	e-mailing	no-limit	with limitation	Not available			
	Web browsing	Available	Not available				
	Content downloading	Music & Video	Music only	Video only	Not available		

A) monthly charges

This attribute ranges from 100 yen, the expected lowest price for the Internet applications, to 20,000 yen. Considering the fact that many applications can be used free of charge once a subscription is made to the Internet, the monthly charge includes the access fee plus (anticipated) applications' fee which are available under a his/her option choice. Be mindful of the fact that the charge of the contents downloaded is not included in this monthly charge and respondents are informed that additional payment may be necessary.

B) Terminal devices

This attribute represents the availability of terminal devices. As mobile terminal devices can be used as Internet access tools, three levels are set for this attribute: 1) PC & mobile, 2) PC only, 3) mobile only.

C) Access speeds

This attribute outlines the transmission speed of access lines that subscribers can enjoy when they access the Internet.

D) e-mailing

This represents the availability of e-mailing services. Since some existing provider services offer free e-mail service with certain limitation of volume, this attribute is categorized into 1) no-limit, 2) with limitation, and 3) not available.

E) Web browsing

This also represents the availability of the web browsing service, which includes searching, posting and exchanging information.

F) Content downloading

This attribute is related to the availability of downloading service of music and video contents that are provided through the Internet. Streaming service is included in this category. Respondents are informed that additional payment should be necessary for this attribute.

As it is impossible to ask the preference for all possible combinations of the attributes, we have extracted minimum sets of the attributes (i.e., the profiles) in accordance with the orthogonal design method. Twelve questions were asked to each respondent, to each of which he/she was requested to make his/her best choice from among three service package profiles arbitrarily selected from the profiles and one profile with no usage.

2.3 Data collection

We conducted an online survey from Feb 26, 2007 to Feb 28, 2007. The questionnaire was composed of 16 face sheet questions and 12 choice questions. The number of respondents was 1,000, who had registered in advance as a member of a survey panel for Internet surveys. As we used the survey panel, there could be a bias in terms of age and/or sex. Therefore we collected same number of data samples from each category as shown below, and then calculated the weight we should use according to the distribution of the Internet users in terms of age and sex in Japan[10]. In addition, there could be differences in preference towards Internet applications between Internet users and non users. Those differences, if any, may give us upward bias in our estimation, since we use samples collected from the respondents who actually using the Internet.

Table 2

Number of samples collected

	age					
	<30	<40	<50	<60	60>=	total
male	100	100	100	100	100	500
female	100	100	100	100	100	500

% of Internet user distribution in Japan

	age					
	<30	<40	<50	<60	60>=	total
male	16.1	10.3	10.2	9.6	6.3	52.54
female	15.6	9.9	9.5	8.3	4.2	47.46

3. Model

3.1. Random Parameter Logit Model

We applied the discrete choice model which is based on the random utility theory. According to the random utility framework proposed by McFadden (1974)[11], utility U is composed of the deterministic component and the random component. That is:

$$U = V + \varepsilon$$

where V denotes the deterministic core, and ε denotes the random component.

This study applies the Random Parameter Logit (RPL) model (or Mixed Logit Model)

[10] "Survey of household's usage on information and communication services", Ministry of Internal Affairs and Communications (2006)

[11] McFadden (1974) pioneered the concept of the model that values the effects of the explanatory variables from consumers' choice data

as it is natural to suppose that an evaluation for each online application is not same among individuals. The RPL model captures the variations of preferences by introducing stochastic terms into the coefficients, which are created by deviations from mean preferences. The RPL model allows these coefficients to be correlated with each other across the attributes.

The RPL specifies the issue for individual *n* who faces *j* alternatives to maximize utility function U_{nj} ,

$$U_{nj} = \beta_n' x_{nj} + \varepsilon_{nj}$$

where x_{nj} is a vector of preferences as a set of attributes when individual *n* choose alternative *j*

β_n is a vector of parameters to be estimated

ε_{nj} is independent and identical distribution (iid) of extreme value

As the distribution of β_n is unknown, it is common to estimate parameters of the distribution function by assuming parametric probability distribution function. In this study we allow the coefficients vector β_i whose elements are $\beta_{i,x}$ be distributed normally across the population with mean vector *b* and variance covariance matrix *W*.

Individual *n* will choose alternative *j* if and only if $U_{nj} > U_{nk}$ for any $j \neq k$. With the RPL model, we assume ε_{nj} be iid extreme value distribution and the probability of individual *n* choosing alternative *j* who is facing β_n can be described as

$$L_{nj}(\beta_n) = \frac{e^{\beta_n' x_{nj}}}{\sum_k e^{\beta_n' x_{nk}}}$$

As β_n is unknown and has a probability distribution, if we let the distribution function of β_n be $f(\beta)$, then the probability of individual *n* choosing alternative *j* out of *J* alternatives is

$$P_{nj} = \int \frac{\exp\left(U\left(\beta_{nj}, X_j\right)\right)}{\sum_{j=1}^{J} \exp\left(U\left(\beta_{nj}, X_j\right)\right)} f(\beta) d\beta$$

3.2. Specification of the utility function

We specify the utility function as below and assume the distribution of β_n be normal distribution. We also assume that β_{price} is non stochastic variable as we should calculate WTP.

$$U_{nj}(\beta_{nj}, X_j) = \beta_{device} + \beta_{n,sp} SPEED_j + \beta_{n,ml} MAIL_j + + \beta_{n,web} WEB_j + \beta_{n,dlm} DLM_j + \beta_{n,dlv} DLV_j + \beta_{price} PRICE_j + \varepsilon_{nj}$$

where

$U_{nj}(\beta_{nj}, X_j)$ is the utility of individual *n* in the case of choosing alternative *j*

$SPEED$: access line speed of alternative *j* (PC (denoted by p) & Mobile (denoted by m))
WEB: Dummy variable for the availability of web browsing (PC & Mobile)
$MAIL$: Dummy variable for the availability of e-mail (PC & Mobile)
DLM: Dummy variable for the availability of downloading music (PC & Mobile)
DLV: Dummy variable for the availability of downloading video (PC & Mobile)
$PRICE$: Monthly charge for alternative *j*

$\beta_{device} \sim \beta_{price}$ are coefficients for the variables shown above

The random disturbance ε_{nj} is assumed to have an independent and identical extreme value distribution.

4. Estimation results

The maximum simulation likelihood method is used to estimate this model. Estimation results of the RPL model are shown below (Table 3 and Table 4). Table 4 shows that the RPL model is an appropriate model for this analysis as most of the standard errors of the random parameters are statistically significant in deviating from 0.

From Table 3, we can see that price (the monthly charge) has a negative effect on the choice probability as anticipated. The coefficients with stochastic distribution are evaluated at the mean value. The coefficients of e-mail function via PCs as well as web browsing via PCs are statistically significant at the 1.0% level. These results are considered to be natural because many current Internet users actually use those two

applications in the main (see Appendix A). The results support the notion that e-mail and web browsing are “killer contents” for Internet usage.

At the same time, downloading music and downloading video via PCs are not statistically significant. Since downloading music to PCs and enjoying it with a portable music player or watching TV or video program on PCs seem to be in fashion, we expected these two coefficient would be statistically significant. This result may indicate that new services such as downloading music, watching video programs as well as enjoying podcasting programs via PCs have been introduced in recent years. However, these services have not been considered as the main applications to gain advantage from using the Internet while e-mail and web browsing are essential applications for PC users for their benefit[12].

On the other hand, the coefficient of music downloading function via mobile is statistically significant at the 10.0% level. This represents the fact that people, especially those in the younger generation whose first media technology for experiencing to access to the Internet is mobile terminal devices, use them not only for making calls but also for downloading music and listen to it. In this sense, mobile terminal devices are becoming portable music players.

The coefficients for mobile e-mail and web browsing, however, are not positive with statistically significant at the 1.0% level. These results may cause difficulties in interpreting consumers’ behavior as it is natural for additional services to be evaluated positively. We believe one of the explanations for this is that many respondents use mobile phone services mainly for voice conversation and not for information services. If that is the case, average assessment of e-mail and mobile browsing services over mobile terminal devices could be very low. In fact, there are few people among respondents who actually use mobile web browsing in our collected samples (41 out of 1000. See Appendix A) and those who do not use mobile e-mail and mobile web browsing service on mobile terminal devices may prefer simpler mobile communication services. If we control the factors of whether respondents use e-mail and web browsing over the mobile terminal devices, the coefficients of e-mail and web browsing via mobile terminal devices become statistically insignificant (see Table 5). These results imply that there could be bias among respondents who do not use mobile terminal devices for Internet access.

[12] New applications have been continuously introduced to the market such as social network society (SNS) and consumer generated media (CGM). In this sense, e-mail, web browsing, downloading music and downloading video are not all applications available on the Internet. From our pre-interview we conducted prior to this survey, however, many interviewees said e-mail and web browsing were the main reasons to use Internet and we have chosen these four applications because of the technical restriction of analysis.

Table 3: Estimation Results 1

p<0.10 *, p<0.05 **, p<0.01 ***

Variables	Coefficient	S.E.	t-value	p-value	
Random parameters in utility functions					
PSPEED	-0.01097	0.0055	-1.9990	0.0456	**
MSPEED	0.00022	0.0050	0.0440	0.9647	
PMAIL	0.13417	0.0513	2.6150	0.0089	***
MMAIL	-0.14383	0.0553	-2.6010	0.0093	***
PWEB	0.32345	0.0461	7.0190	0.0000	***
MWEB	-0.20171	0.0441	-4.5710	0.0000	***
PDLM	0.00055	0.0457	0.0120	0.9905	
PDLV	0.01240	0.0493	0.2520	0.8013	
MDLM	0.08082	0.0457	1.7700	0.0768	*
MDLV	-0.06292	0.0472	-1.3340	0.1823	
Nonrandom parameters in utilitiy functions					
PC	-0.73862	0.0632	-11.6950	0.0000	***
MOB	-0.35453	0.0634	-5.5890	0.0000	***
PRICE	-0.00004	0.0000	-9.3000	0.0000	***

Table 4: Derived standard deviations of parameter distributions

p<0.10 *, p<0.05 **, p<0.01 ***

Variables	Coefficient	S.E.	t-value	p-value	
Derived standard deviations of parameter distributions					
PSPEED	0.0550	0.008	6.962	0.000	***
MSPEED	0.0217	0.012	1.803	0.072	*
PMAIL	0.4806	0.067	7.204	0.000	***
MMAIL	0.7975	0.047	16.848	0.000	***
PWEB	0.4404	0.066	6.664	0.000	***
MWEB	0.3008	0.075	3.990	0.000	***
PDLM	0.4017	0.062	6.442	0.000	***
PDLV	0.6265	0.072	8.733	0.000	***
MDLM	0.2593	0.086	3.007	0.003	***
MDLV	0.5377	0.061	8.782	0.000	***

Table 5: Controlling mobile users

p<0.10 *, p<0.05 **, p<0.01 ***

Variable	Coefficient	S.E.	t-value	p-value	
Random parameters in utility functions					
PSPEED	−0.0091	0.0055	−1.652	0.099	
MSPEED	−0.0018	0.0052	−0.348	0.728	
PMAIL	0.1180	0.0522	2.260	0.024	**
MMAIL	0.1128	0.1732	0.651	0.515	
PWEB	0.3263	0.0487	6.705	0.000	***
MWEB	−0.1227	0.1580	−0.776	0.438	
PDLM	−0.0130	0.0465	−0.280	0.780	
PDLV	−0.0152	0.0503	−0.302	0.763	
MDLM	0.0718	0.1518	0.473	0.636	
MDLV	0.0198	0.1644	0.121	0.904	
Nonrandom parameters in utility functions					
PC	−0.7302	0.0631	−11.570	0.000	***
MOB	−0.3559	0.0634	−5.614	0.000	***
PRICE	0.0000	0.0000	−9.319	0.000	***
NMMAIL	−0.2691	0.1725	−1.560	0.119	
NMWEB	−0.0795	0.1597	−0.498	0.619	
NMDLM	0.0194	0.1540	0.126	0.900	
NMDLV	−0.0912	0.1665	−0.548	0.584	

In this study, price factor as a monthly charge for packaged services has been included in the estimation equation. As the random utility function is described in a linear equation, the willingness to pay (WTP) for each service can be calculated by dividing the coefficients of services by the coefficient of the price[13]. This can be illustrated in the following simple formula:

$$\partial PRICE / \partial z = -\partial U / \partial z * \partial PRICE / \partial U = -(\beta_{device} \sim \beta_{dlv}) / \beta_{price}$$

Where ***z*** denotes: SPEED, MAIL, WEB, DLM, DLV

Table 6 shows the WTPs for the applications available on the Internet either with a PC or mobile terminal. The web browsing service with a PC is especially high (¥8,598) in all applications and this reflects the high demand for this function among Internet users.

[13] As the random utility function allows the coefficients to be distributed, these WTPs illustrate those of the average individual.

The WTP of e-mail service (¥3,567) is also relatively high. These two functions can be considered as key fundamental applications for Internet users via PC.

On the other hand, the WTP of music download service for mobile terminal devices is ¥ 2,149 and statistically significant at the 10.0% level.

As the actual flat-rates for broadband access line for PCs ranges from ¥2,000 to ¥ 3,500 for ADSL (1Mbps ~ 50Mbps) and about ¥7,500 for optical fiber (100Mbps)[14], let average monthly cost of ADSL providing 10Mbps service be ¥3,000, then the average consumer will fain a surplus of approximately ¥9,000 by using e-mail and web browsing.

Table 6: Willingness to Pay (WTP)

PMAIL	3,567	***
MMAIL	−3,823	***
PWEB	8,598	***
MWEB	−5,362	***
PDLM	15	
PDLV	330	
MDLM	2,149	*
MDLV	−1,673	

5. Conclusion

In this study we showed that the total WTPs for both e-mail and web browsing applications via PCs exceed the cost of having broadband Internet access. In addition, the results indicated that the downloading music application is a key element in using mobile terminal devices for the Internet.

We conducted this study in order to analyze the present consumers' behavior and estimate their surplus derived from the Internet usage and online applications. The findings we show in this study will change as Internet applications and new technology develop. For instance, no one had anticipated the use of mobile terminal devices as a music player when we could use them only for making calls 10 years ago. In the future, as new applications such as net shopping, net auction, online gaming, web logging and SNS have further developed and disseminated, the composition of applications that Internet users evaluate highly will change. Herein we have merely calculated the WTPs of online applications employing the conjoint method, such that there may be another approach to measuring consumers' evaluation for online applications by considering usage time (opportunity cost). For future research, it may be of interest to analyze the impact of network externality effects on consumer evaluations of online applications.

[14] Kakaku.com http://kakaku.com/bb/ranking/ (accessed on July 29, 2007) The list of the cheapest providers in Tokyo.

References

Allenby, G.M., and P.E. Rossi (1999)”Marketing models of consumer heterogeneity”. *Journal of Econometrics*. Vol.89.

Chintagunta,P., D.Jain, and N.Vilcassim(1991),"Investigating heterogeneity in brand preference in logit models for panel data", *Journal of Marketing Research*. Vol.28.

Hensher, D.A., J.M. Rose, and W. H. Greene (2005), Applied Choice Analysis: A Primer, Cambridge University Press

Huber, J. and Train,K.(2001) On the similarity of classical and Beyesian estimates of individual mean partworths., Marketing Letters 12, pp.257-267.

Kuehl, R.O. (1999), Design of Experiments: Statistical Principles of Research Design and Analysis: Second Edition, Duxbury Press.

Louviere, J.J, D.A. Hensher, and J.D. Swait (2001), Stated Choice Methods: Analysis and Applications, Cambridge University Press

Luce, R.D. and J.W. Tukey (1964) "Simultaneous conjoint measurement: A new type of fundamental measurement", *Journal of Mathematical Psychology*,

McFadden, D. (1973). Conditional Logit Analysis of Qualitative Choice Behavior. *Frontiers in Econometrics,* 6. New York, Academic Press.

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy,* 82, 34-55.

The Ministry of Internal Affairs and Communications. (2006). Information and Communications Statistics Database.

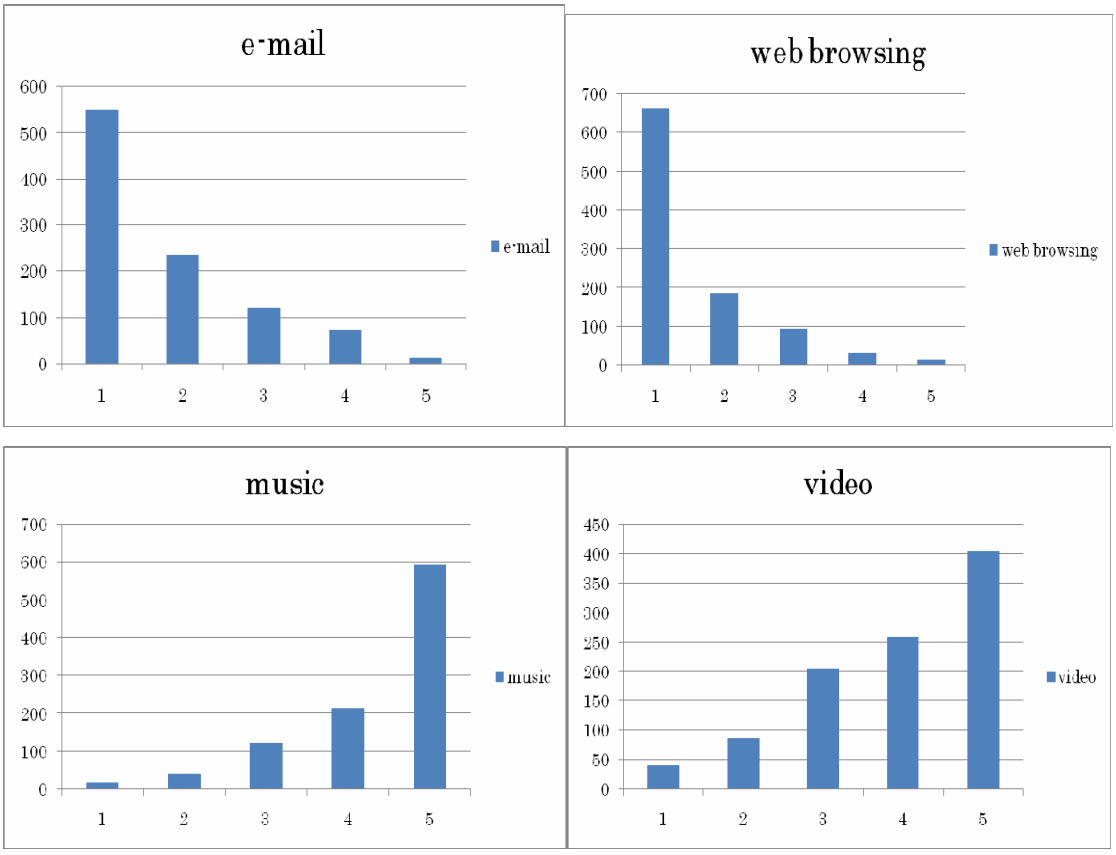
Train, K.E. (2003), Discrete Choice Methods with Simulation, Cambridge University Press

Appendix A

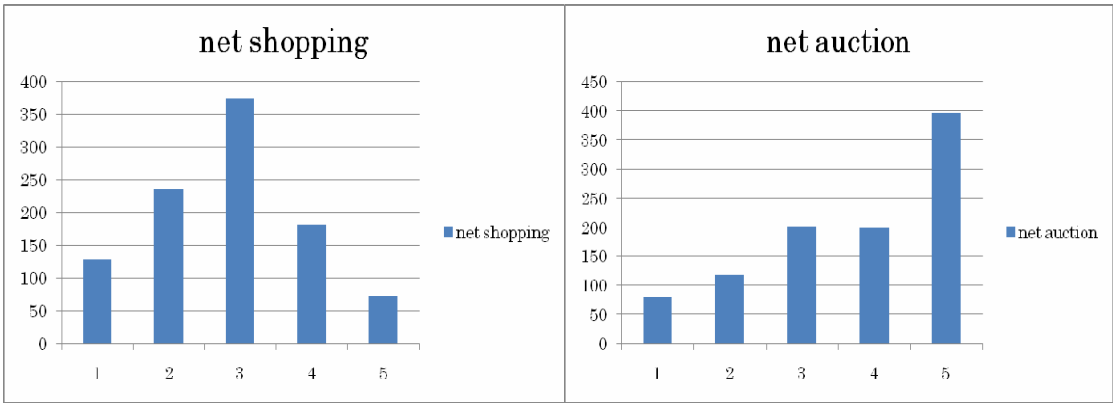
Actual frequency of use

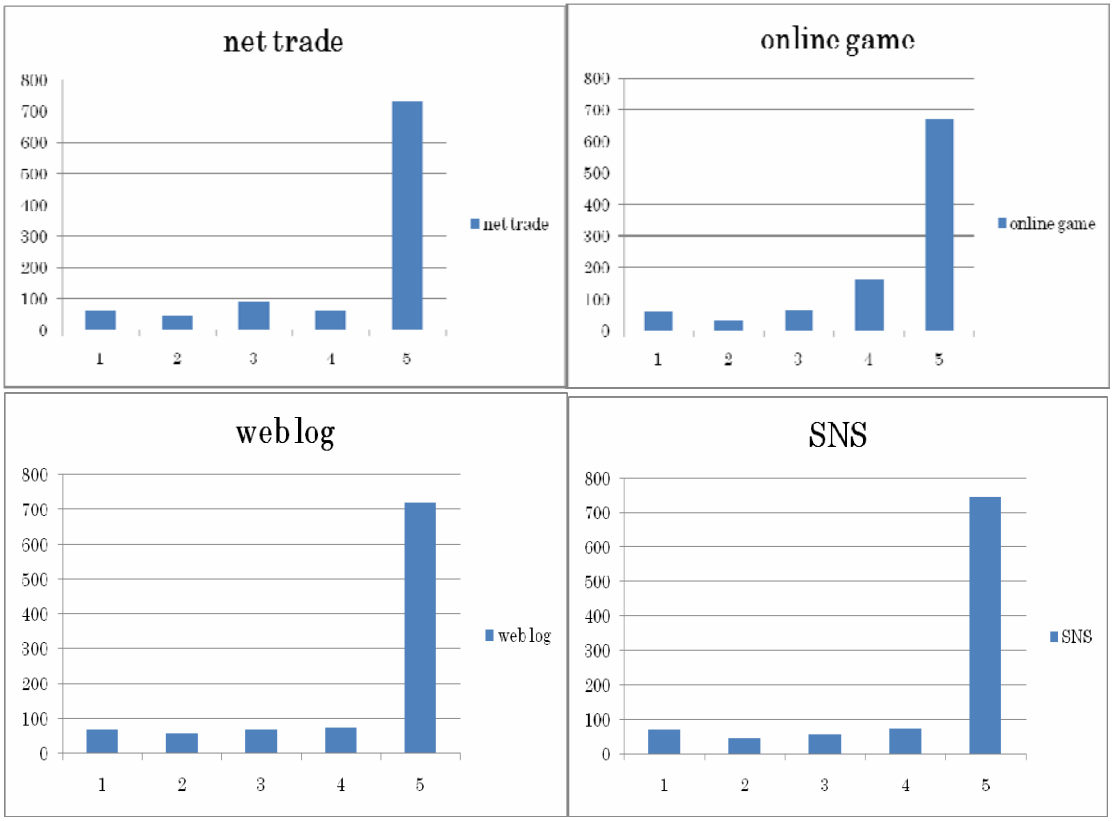
1	Very often
2	Often
3	sometimes
4	Seldom
5	Never

<PC> 995 samples

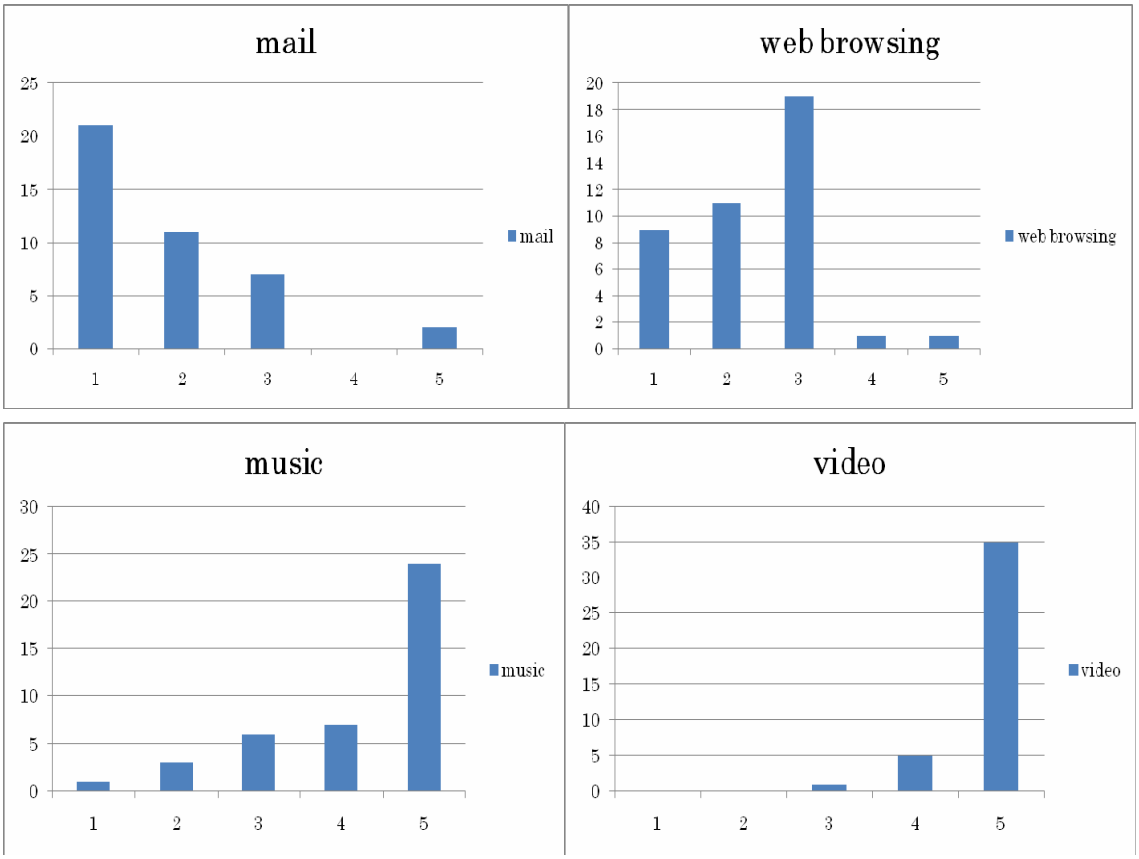


(other applications)

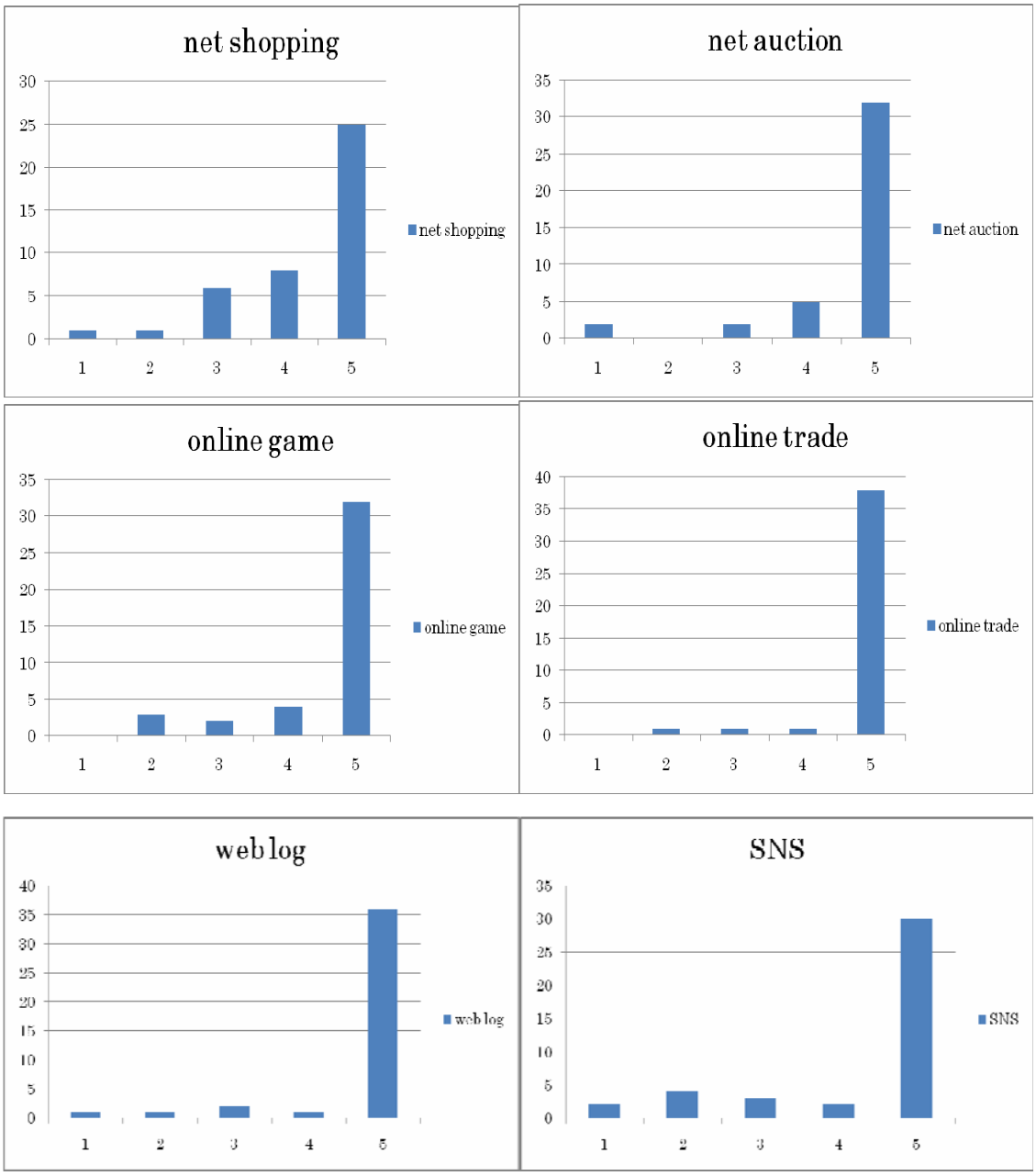




<Mobile> 41 samples (reference)



<other applications>



Appendix B

Other estimations

1. Period of the Internet Usage

group 1 (KG1): less than 1 year, group 2 (KG2): less than 5 years,

group 3 (KG3): 5 years and above.

p<0.10 *, p<0.05 **, p<0.01 ***

Variable	Value	S.E.	t-value	p-value	
Random parameters in utility functions					
PSPEED	−0.013	0.010	−1.331	0.183	
MSPEED	−0.014	0.010	−1.365	0.172	
KG1PMAIL	−0.237	0.322	−0.735	0.462	
KG2PMAIL	−0.057	0.116	−0.486	0.627	
KG1MMAIL	−0.507	0.425	−1.191	0.234	
KG2MMAIL	−0.350	0.152	−2.303	0.021	**
KG1PWEB	0.070	0.367	0.191	0.848	
KG2PWEB	0.011	0.142	0.076	0.940	
KG1MWEB	0.564	0.409	1.378	0.168	
KG2MWEB	−0.218	0.152	−1.435	0.151	
PDLM	−0.018	0.077	−0.240	0.811	
PDLV	−0.091	0.092	−0.990	0.322	
MDLM	0.563	0.275	2.048	0.041	**
MDLV	−0.194	0.281	−0.691	0.490	
Nonrandom parameters in utility functions					
PC	−0.331	0.078	−4.242	0.000	***
MOB	−0.567	0.102	−5.549	0.000	***
PRICE	0.000	0.000	−4.832	0.000	***
NMMAIL	0.166	0.081	2.066	0.039	**
NMWEB	−0.001	0.077	−0.008	0.994	
NMDLM	−0.386	0.277	−1.393	0.164	
NMDLV	0.159	0.275	0.578	0.563	

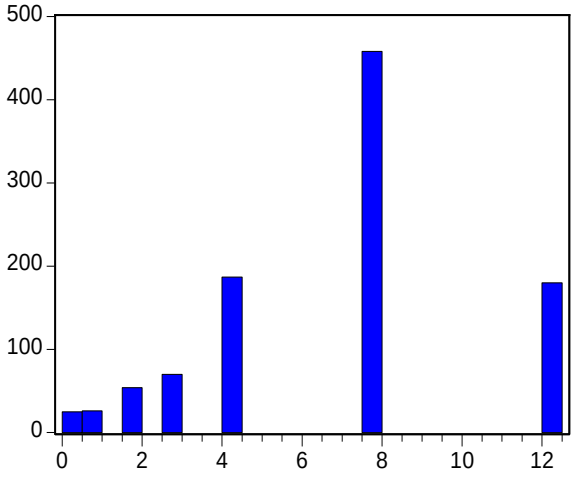
2. Internet usage time per week

group 1 (G1) : 0<=G1<15, group 2 (G2): 15<=G2<30, group 3 (G3): 30<=G3

p<0.10 *, p<0.05 **, p<0.01 ***

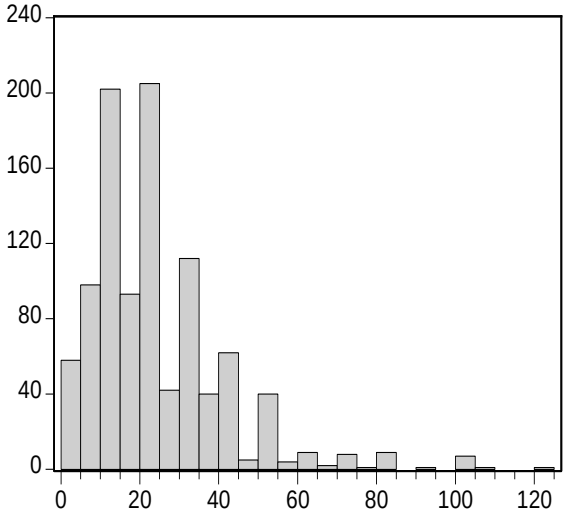
Variable	Value	S.E.	t-value	p-value	
Random parameters in utility functions					
PSPEED	-0.0067	0.0053	-1.2710	0.2039	
MSPEED	-0.0050	0.0054	-0.9350	0.3497	
PMAIL	0.1084	0.0680	1.5950	0.1106	
PWEB	0.3320	0.0651	5.0990	0.0000	***
MMAIL	0.0884	0.1770	0.4990	0.6177	
MWEB	-0.1456	0.1642	-0.8870	0.3752	
PDLM	-0.0091	0.0471	-0.1930	0.8469	
PDLV	-0.0128	0.0489	-0.2610	0.7938	
MDLM	0.0801	0.1547	0.5170	0.6049	
MDLV	-0.0239	0.1660	-0.1440	0.8855	
Nonrandom parameters in utility functions					
PC	-0.7306	0.0632	-11.5570	0.0000	***
MOB	-0.3571	0.0634	-5.6350	0.0000	***
PMTIMEG2	-0.0106	0.0835	-0.1270	0.8989	
PMTIMEG3	-0.0355	0.1023	-0.3470	0.7283	
PWTIMEG2	0.0361	0.0870	0.4150	0.6784	
PWTIMEG3	-0.0314	0.1060	-0.2970	0.7668	
MMTIMEG2	0.0485	0.0861	0.5620	0.5738	
MMTIMEG3	-0.0467	0.1075	-0.4340	0.6640	
MWTIMEG2	0.0568	0.0835	0.6800	0.4963	
MWTIMEG3	-0.0265	0.1027	-0.2580	0.7962	
PRICE	0.0000	0.0000	-9.1480	0.0000	***
NMMAIL	-0.2388	0.1706	-1.4000	0.1616	
NMWEB	-0.0616	0.1595	-0.3860	0.6994	
NMDLM	-0.0043	0.1566	-0.0280	0.9779	
NMDLV	-0.0586	0.1679	-0.3490	0.7273	

Histogram of period of the Internet usage



Series: SER01	
Sample 1 1000	
Observations 1000	
Mean	6.621875
Median	7.500000
Maximum	12.00000
Minimum	0.000000
Std. Dev.	3.378074
Skewness	0.017728
Kurtosis	2.249926
Jarque-Bera	23.49450
Probability	0.000008

Histogram of Internet usage time per week



Series: SERIES01	
Sample 1 1000	
Observations 1000	
Mean	22.47600
Median	20.00000
Maximum	120.0000
Minimum	1.000000
Std. Dev.	16.76605
Skewness	1.870672
Kurtosis	8.172029
Jarque-Bera	1697.814
Probability	0.000000