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**Conference Paper**

## The value of personal information in the e-commerce market

24th European Regional Conference of the International Telecommunications Society (ITS):  
"Technology, Investment and Uncertainty", Florence, Italy, 20th-23rd October, 2013

**Provided in Cooperation with:**

International Telecommunications Society (ITS)

*Suggested Citation:* Jitsuzumi, Toshiya; Koguchi, Teppei (2013) : The value of personal information in the e-commerce market, 24th European Regional Conference of the International Telecommunications Society (ITS): "Technology, Investment and Uncertainty", Florence, Italy, 20th-23rd October, 2013, International Telecommunications Society (ITS), Calgary

This Version is available at:

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# **The Value of Personal Information in the E-Commerce Market**

**Toshiya Jitsuzumi<sup>i</sup>, Teppei Koguchi<sup>ii</sup>**

## **Abstract**

The purpose of this analysis is to clarify the effect of personal information on switching costs in the Internet shopping market. In order to shop on Internet shopping sites, users must register with the site and provide information. In addition, many Internet shopping sites provide the user's viewing and buying histories on the site. If a user changes to another Internet shopping site, the personal information that has been registered and stored on his or her previously used site is not transferred to the new site, so the user must re-register his or her personal information.

In this analysis, we empirically demonstrate the extent to which registered information, viewing histories, and buying histories drive up switching costs. This analysis revealed that when users change Internet shopping sites, purchase histories or registered personal information represent switching costs of the same magnitude as traditional switching costs, such as brand attachment or familiarity with the site.

## **1. Background and purpose of the analysis**

The purpose of this analysis is to clarify the effect of personal information on switching costs in the Internet shopping market.

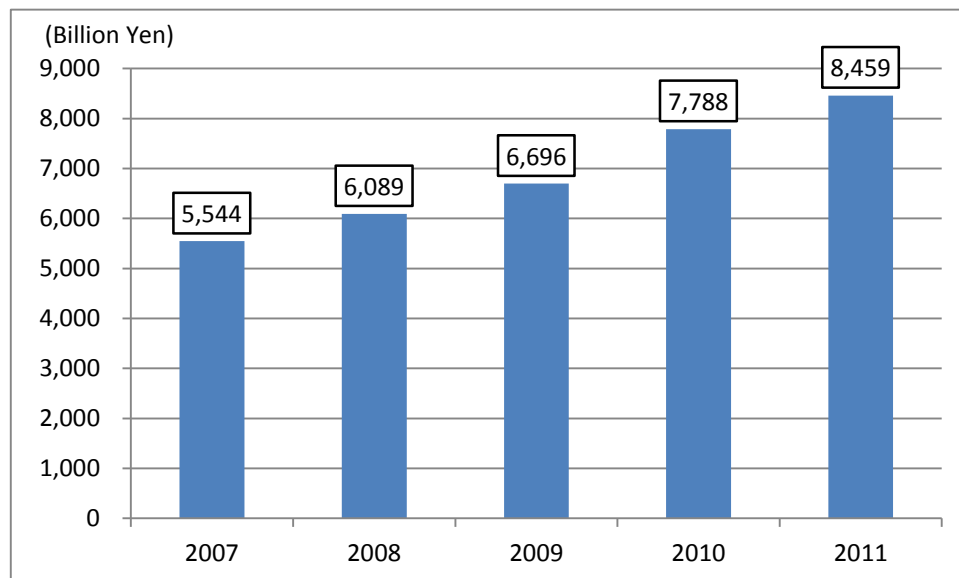
In recent years, B to C e-commerce has become popular in Japan owing to the development of broadband and the proliferation of smartphones. According to the Ministry of Economy, Trade and Industry, the size of the Japanese B to C e-commerce market was 8.5 trillion yen in 2011, which represents a year-on-year increase of 8.6 percent (see Figure 1). B to C e-commerce primarily involves the retail and service industries, and this total market represented 5.9 trillion yen in 2011.

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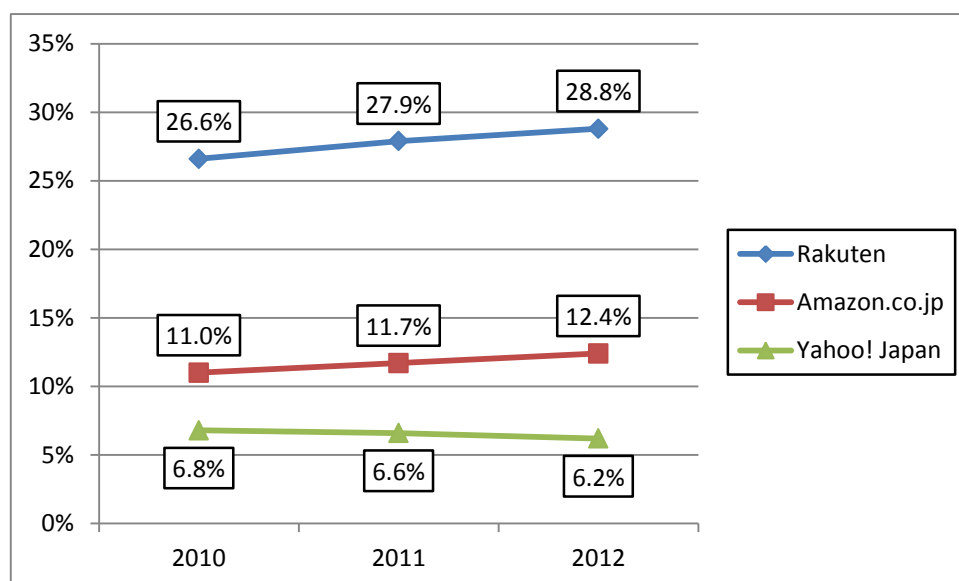
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Figure 1 Growth of the Japanese B2C e-commerce market



Source: Ministry of Economy, Trade and Industry (2012), p.7

Figure 2 Shares of Internet shopping sites in Japan



Source: Rakuten, Inc. fiscal 2012 Financial Results

The retail and services industries mainly use Internet shopping sites to conduct B to C e-commerce. The primary Internet shopping sites in Japan are Rakuten, Amazon, and Yahoo. Among these, the market shares of Rakuten and Amazon have grown in recent years and these two sites have a share of more than 40% (see Figure 2). In the

Japanese Internet shopping market, Rakuten and Amazon are therefore the main players.

In order to shop on Internet shopping sites, users must register with the site and provide information such as their names, e-mail addresses, addresses, and credit card numbers. In addition, many Internet shopping sites provide the user's viewing and buying histories on the site to make shopping more convenient. All of these items represent personal information; therefore, Internet shopping sites register and store many types of personal information. If a user changes to another Internet shopping site, the personal information that has been registered and stored on his or her previously used site is not transferred to the new site, so the user must re-register his or her personal information. This point may represent a switching cost for users.

In this analysis, we empirically demonstrate the extent to which registered information, viewing histories, and buying histories drive up switching costs.

## **2. The literature on switching costs**

Switching costs are the psychological or economic costs incurred when customers switch from one good or service to another.

There are many theoretical studies focused on switching costs. Klemperer (1987) was analyzed for competition between new entry brand and existing brand using a two-period model. Shy (2002) conducted a model analysis of switching costs in the financial industry. In terms of survey papers, there is the work of Farrell and Klemperer (2007).

Through an empirical analysis, Shy (2002) proposed a method for estimating switching costs. Focusing on the information and communications industry, Valletti and Cave (1998) analyzed the mobile phone market in the UK. In addition, although they did not directly estimate switching costs, Brynjolfsson and Smith (2000) show that, in the e-commerce market, consumer confidence in the service provider justifies price differences.

As described above, many studies focus on switching costs, but few studies account for registered information, viewing histories, and buying histories as representing potential switching costs. Considering that the use of personal information will continue to be involved in the provision of various Internet services in the future, it is very important to further study this issue.

## **3. Analysis framework**

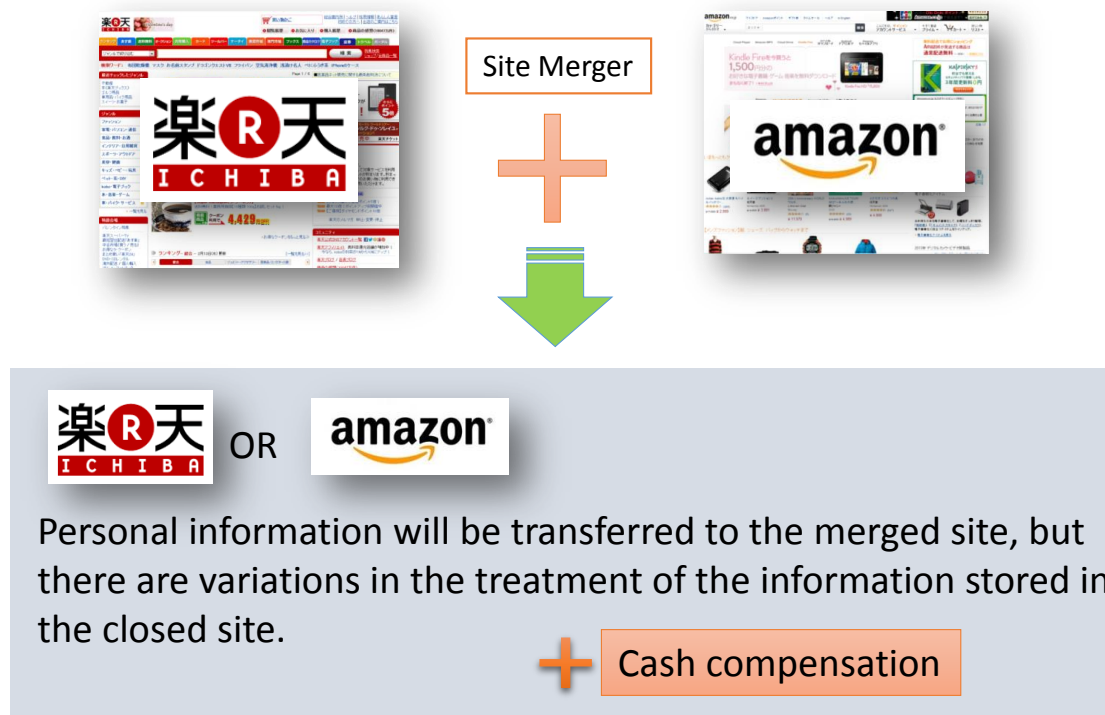
In this paper, we conducted a conjoint analysis using a web questionnaire referring

to the framework of Jitsuzumi (2012). After a preliminary questionnaire was conducted in January 2013, a web questionnaire was conducted on a sample of 650 respondents in March 2013. The preliminary questionnaire was conducted to determine the levels and attributes for profile creation.

In the conjoint analysis, we selected Rakuten and Amazon, the two major Internet shopping sites in Japan, and asked respondents to imagine that these two sites are going to be integrated and that one of them will close. This scenario is presented in Figure 3.

For the user, familiarity and attachment to the site that will close is the cost of the integration. This cost represents the previously discussed traditional switching cost. In addition, in this assumption, the management of personal information registered on the site that will close as well as the migration of the viewing and buying histories at the site are concerns. In this analysis, we regarded these concerns as the switching costs associated with personal information.

Figure 3 Questionnaire scenario



Source: Prepared by the author

In the conjoint analysis, we created multiple profiles including personal information on the site that will close, as well as viewing and buying histories, in

addition which site is closed. Further, in the creation of a profile, we set the compensation that can be received when each assumption occurs. This compensation is intended to represent the willingness to accept (WTA) for each assumption.

The attributes and levels of the profiles are shown in Table 1. In the estimation, we used the orthogonal design method to determine 16 profiles and attribute levels.

Table 1 Attributes and levels

Attributes	Levels			
Which site exists?	Rakuten	Amazon.co.jp		
What will become of personal information registered in the shuted down site ?	Used in other business of shut down site operator	Completely deleted		
What will become of buying history in the shuted down site ?	Carry over to the surviving site	Completely deleted		
What will become of browsing record in the shuted down site ?	Carry over to the surviving site	Completely deleted		
Compensation for the situation above	1,000 yen	5,000 yen	10,000 yen	20,000 yen

In addition, in terms of the design of the analysis, we excluded respondents who have never used both Rakuten and Amazon from the analysis. We did this because respondent who do not have experience with both sites and have not registered their personal information cannot understand the profile. Finally, we assigned four conjoint questions to 360 respondents and collected 1440 samples.

In the analysis, we identified the probability function where user  $i$  chooses alternative  $k$  and the utility function as in Expressions 1 (probability function), Expressions 2 (utility function without shift parameters) and 3 (utility function with shift parameters for age, purchase frequency, and the amount of purchase per one time of shopping), respectively where  $x$  represents an attribute vector for the chosen alternatives,  $g$  represents a distribution function of parameter  $\beta$ , and  $\theta$  is its parameter. And, we conducted an estimation using the random parameter logit model. We regarded the WTA calculated based on the estimation results as the switching cost for each attribute.

$$P_{ik} = \int \frac{\exp(\beta_i' X)}{\sum_j \exp(\beta_j' X)} g(\beta|\theta) d\beta \quad (\text{Expressions 1})$$

$$\begin{aligned} U_{ij} = & \beta_{Amazon,i} \times D_{Amazon} + \beta_{Rakuten,i} \times D_{Rakuten} \\ & + \beta_{inf,i} \times D_{inf} + \beta_{buy,i} \times D_{buy} + \beta_{view,i} \times D_{view} \\ & + \beta_{compensation,i} \times compensation + \varepsilon_{ij} \end{aligned} \quad (\text{Expressions 2})$$

$$\begin{aligned} U_{ij} = & (\alpha_{age}^{Amazon} \times age_i + \alpha_{freq}^{Amazon} \times freq_i + \alpha_{perchase}^{Amazon} \times perchase_i + \beta_{Amazon,i}) \times D_{Amazon} \\ & + (\alpha_{age}^{Rakuten} \times age_i + \alpha_{freq}^{Rakuten} \times freq_i + \alpha_{perchase}^{Rakuten} \times perchase_i + \beta_{Rakuten,i}) \times D_{Rakuten} \\ & + (\alpha_{age}^{inf} \times age_i + \alpha_{freq}^{inf} \times freq_i + \alpha_{perchase}^{inf} \times perchase_i + \beta_{inf,i}) \times D_{inf} \\ & + (\alpha_{age}^{buy} \times age_i + \alpha_{freq}^{buy} \times freq_i + \alpha_{perchase}^{buy} \times perchase_i + \beta_{buy,i}) \times D_{buy} \\ & + (\alpha_{age}^{view} \times age_i + \alpha_{freq}^{view} \times freq_i + \alpha_{perchase}^{view} \times perchase_i + \beta_{view,i}) \times D_{view} \\ & + \beta_{compensation,i} \times compensation + \varepsilon_{ij} \end{aligned} \quad (\text{Expressions 3})$$

where Amazon = merging into Amazon; Rakuten = merging into Rakuten; inf = deleting personal information; buy = carrying over buying history; view = carrying over viewing history; compensation = compensation for each situation (yen); age = age; freq = purchase frequency most recent one year, eight phases of choices; perchase = purchase per one time of shopping, eight phases of choices; D means dummy variable

#### 4. Estimation results

The estimation results are shown in Table 2. With regard to the estimation results for Expression 2, all results were significant and positive except for those for viewing history. In addition, the WTA for each variable was determined based on the nuisance charges coefficient shown in Table 3. In Table 3, the WTA related to personal information is approximately equal to the brand-specific WTA for Rakuten and Amazon. Based on this, it can be inferred that registered personal information and buying history represent costs that are nearly equal to those related to factors that have traditionally been regarded as switching costs.

With regard to the shift parameters for significant variables, the age parameter was significant and positive for everything other than the variable of deleting personal information to merging the sites. Additionally, purchase frequency was significant and positive for the Rakuten and Amazon parameters. This supports the traditional switching cost notion that the more contact with the brand, the more brand attachment

increases. With regard to the factors that affect the switching cost related to personal information, we did not obtain conclusive results from the estimates.

Table 2 Estimation results

Without shift parameter				
Variable	Coefficient	Standard Error	p-value	
Amazon	0.316	0.110	0.004	
Rakuten	0.306	0.109	0.005	
Personal information	0.289	0.820	0.004	
Buying history	0.289	0.838	0.006	
Viewing history	0.103	0.846	0.222	
Compensation	0.0000421	0.0000059	0.000	

With shift parameter				
Variable	Shift Parameter	Coefficient	Standard Error	p-value
Amazon		-2.431	1.101	0.027
	age	0.016	0.008	0.048
	purchase frequency	0.566	0.105	0.000
	purchase per shopping	0.060	0.112	0.589
Rakuten		-1.015	1.082	0.348
	age	0.018	0.008	0.027
	purchase frequency	0.367	0.103	0.000
	purchase per shopping	-0.056	0.112	0.620
Personal information		0.272	0.949	0.774
	age	0.010	0.007	0.156
	purchase frequency	-0.082	0.894	0.360
	purchase per shopping	-0.027	0.097	0.779
Buying history		1.416	0.987	0.151
	age	-0.020	0.007	0.006
	purchase frequency	-0.013	0.093	0.888
	purchase per shopping	-0.007	0.991	0.942
Viewing history		1.023	0.985	0.299
	age	0.005	0.007	0.500
	purchase frequency	-0.053	0.094	0.575
	purchase per shopping	-0.117	0.100	0.246
Compensation		0.0000460	0.0000069	0.000

Table 3 WTA for each variable

Variable	WTA (Yen)
Amazon	¥7,506
Rakuten	¥7,268
Personal information	¥6,865
Buying history	¥6,865
Viewing history	(Insignificant)

## 5. Conclusion

This analysis revealed that when users change Internet shopping sites, purchase histories or registered personal information represent switching costs of the same magnitude as traditional switching costs, such as brand attachment or familiarity with



the site. This is greatly indicative of the competitiveness of the Internet shopping market. From the managerial perspective of the companies operating these sites, allowing users to register a large amount of personal information upon service delivery and enhancing services that utilize accumulated personal information, such as purchase histories, would be effective strategies. In addition, it is effective to construct a system in which registered or stored personal information cannot be used at different sites because this type of system would prevent users from changing to different service providers by enclosing them.

On the other hand, from the perspective of government policies related to competition, because switching costs are a factor in preventing price and service competition, it is necessary to analyze what types of personal information are registered or stored on these sites because it is possible for personal information to represent a high switching cost; in this case, users will be unwilling to change to service providers that offer lower prices or higher quality. To promote competition, the policy to solve the problem of switching costs is needed. In order to do that, we have to consider the policy that makes possible transportation of personal information.

With regard to personal information, the “midata” project, which has recently been promoted in the United Kingdom, has attracted much attention. This project was announced by the United Kingdom’s Department for Business, Innovation, and Skills (BIS) in 2011. The goal of the “midata” project is for consumers to be able to access and use their personal and company data. If the “midata” project is implemented, users will be able use personal information that has been registered on previously used sites when migrating to new sites. Since this analysis revealed that personal information represents a switching cost, this project would be able to solve the problem of switching costs associated with personal information and therefore promote more competition.

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