

# How consumer characteristics moderate time effects on online purchase preference: an empirical analysis

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In this paper, we posit that time-related effects (i.e., the importance of saving time) on patronage preference for shopping online will be moderated by consumer characteristics. To explore these moderating effects, we empirically examine the moderating roles of consumer characteristics on the respective effects of shopping-time-saved and delivery on online purchase preference. On the basis of analyses performed on data gleaned from an Internet-based survey, this study demonstrate that time effects related to both shopping-time-saved and delivery on online purchase preference are more pronounced for consumers who are male, young, and more starved for time. In addition, the effect of delivery time on online patronage preference is amplified by disposable income, but attenuated by online shopping experience. Through our analyses, we also find that Japanese consumers value delivery time to a greater degree than Chinese and American consumers do.

Key words: consumer characteristics, moderating effects, time effects, shopping-time-saved, delivery time, online patronage preference, Internet survey, logit model

## I. Introduction

Given the rapid propagation of the Internet and the widespread popularity of e-commerce, online shopping has penetrated our daily live (Bhuiyan et al., 2013; Dennis et al., 2010; Wan

et al., 2012). In the last decade, more than 60% of the 2.8 billion Internet users worldwide have begun shopping on the Internet, making online shopping the fastest-growing activity among Internet users. As illustrated by e-commerce retail sales figures between 2006 and 2013,<sup>1)</sup> the Asia/Pacific region provides the

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1) See statistical report on e-commerce development by eMarket, U.S. Census bureau, and METI.

greatest potential in the world with regard to growth in e-commerce. Though online shopping offers a number of key strengths, one of the most critical factors related to the growth of e-commerce is the short amount of time online shopping requires relative to shopping at traditional retail outlets (Bellman et al., 1999; Punj, 2012; Rohm and Swaminathan, 2004).

As temporal factors have grown in importance as they relate to e-commerce, the importance of saving time in online shopping has received increased attention from researchers and practitioners alike. Many works (e.g., Comor, 2000; Goolsbee and Klenow, 2006; Okada and Hoch, 2004; Punj, 2012) thus have specifically sought to explore some relationships between time-related effects and patronage preference in Internet shopping. Some of them also have pointed out that the effects of time on online purchase preference will be influenced by some consumer characteristics in the meanwhile (Alreck et al., 2011; Comor, 2000; Punj, 2012). However, the studies related to this are still limited. For instance, Punj (2012) has produced pioneering empirical work to identify the moderating effects of consumer characteristics on the relationships between time effects and online purchase preference, and the study found that compared with lower-income consumers, higher-income consumers tend to have more interest in the time-saving characteristics of Internet shopping. Despite the utility of Punj's research, he only focused on the effects of income but did not discuss

other consumer characteristics, and also neglected to explore another important factor related to Internet shopping—delivery time.

Delivery time is also a very important time factor for Internet shopping. Delivery of goods procured through Internet purchases requires additional time because of delayed arrival (Liao and Keng, 2013; Ryan and Valverde, 2005). Some scholars have treated delivery time as a perceived risk due to information asymmetry associated with online shopping (Forsythe and Shi, 2003; Liao and Keng, 2013; Salam et al., 2003). In some empirical works, like Forsythe and Shi (2003) and Lim (2003), they are supported that the perceived risk of delivery time was a significant predictor for frequency of searching with intent to buy and frequency of purchasing online. Meanwhile, those risk perception may also be moderated by consumer characteristics. Among them, Forsythe and Shi (2003) demonstrated that the experiences of online shopping could effectively reduce the perceived risks from delivery time. As such, the negative effect of delivery time is another important element that will be identified in our paper, though many researchers have shown that shoppers often prefer to make their purchases online, as it is less time-consuming than shopping in physical stores (Bellman et al., 1999; Punj, 2012; Rohm and Swaminathan, 2004).

The purpose of the present study is to investigate how consumer characteristics moderate the respective effects of two important time-

related indicators (i.e., shopping-time-saved, and delivery time) on online purchase preference. We first adopt logistic regression method to estimate the effects of shopping-time-saved and delivery time on the likelihood of online purchase decision with the control for several certain personal characteristics of shoppers, including gender, income, age, education level, country, work times, and the experience of online shopping. The regression results show that shopping-time-saved relates positively to consumer online purchase decision, while delivery time relates negatively if it takes more than four days. Second, to clarify how consumer characteristics moderate time-related effects on online purchase preference, this study elucidates the nature of the interactions between the above consumer characteristics and two time-related factors. We find that most of the personal characteristics moderate time effects on the preference of purchasing online indeed, except education.

This paper contributes to the existing literature in three ways. Firstly, given that most of the existing studies neglect to check the moderating (or mediating) effects of consumer characteristics on the relationship between delivery time and online purchase preference, our study discusses the time effects on the preference of online purchase not only from the perspective of shopping-time-saved, but also from delivery time. Secondly, unlike the existing researches, we reinterpret the performance of

consumer characteristics in purchasing preferences for online and offline from the perspective of moderating effects on time. In previous studies, many of them focus on the direct effects of consumer characteristics on their patronage performance for Internet or local retailers. Some recent studies have shown that those consumer characteristics are only marginally significant predictors of consumer tendency to shop online (Hernández et al., 2011; Roussos, 2007), despite many studies suggesting that personal characteristics of shoppers can influence their shopping practices (e.g., Bellman et al., 1999; Levin et al., 2005; Lohse et al., 2000; y Monsuwé et al., 2004). In addition, we re-check the previous results, and improve the existing conclusions of Bellman et al. (1999), Levin et al. (2003, 2005), and Hernández et al. (2011). The third contribution of the present paper is relates to the method of data collection. Taking into the difficulty of data, our study improves the possibilities of data collection through the experimental investigation and using Stated Preference data.

To explore the issues outlined above, we have structured this paper in a number of interrelated sections. Section 2 features a review of salient literature that grounds the key hypotheses. In Section 3, we describe our research methodology, including our data collection practices and modelling techniques. In Section 4, we report the results of our econometric analysis and explicate the key findings that can be generated

thereof. Finally, we offer some conclusions, describe the implications of the current research, and provide suggestions for future research in Section 5.

## II. Reviews and hypotheses

As noted in the introductory section, with the rapid development of e-commerce, more and more people are interested in online shopping due to the benefit of saving time (Bellman et al., 1999; Punj, 2012). Time is typically treated as a key consumable resource in both on- and offline shopping (Bhatnagar et al., 2000), and a number of studies (e.g., Punj, 2012) have pointed out that saving time is one of the important online purchase objectives in Internet shopping. Given this, time-related effects on online purchase preference have been focused on by many studies (Comor, 2000; Goolsbee and Klenow, 2006). For instance, Okada and Hoch (2004) and Ryan and Valverde (2005) revealed that online shopping usually allows consumers to save time, but the need for goods purchased on the Internet to be physically delivered incurs a time cost on the consumers, which implies that shopping-time-saved positively affects online patronage preference, while long delivery time has a negatively effect on it. But in the meanwhile, some studies like Alreck et al. (2011) and Comor (2000) suggested that the degree of those time effects

would be influenced by some certain consumer characteristics.

In existing literature, many studies have focused on the relationships between consumer characteristics and their online purchase preference (e.g., Bellman et al., 1999; Levin et al., 2005; Lohse et al., 2000; y Monsuwé et al., 2004). According to Bellman et al. (1999) and Swinyard and Smith (2003), consumers that are younger, wealthier, and educated are most likely to engage in online shopping. In addition, it also has been shown that while women are the majority of shoppers in traditional markets, Internet shopping tends to be dominated by males (Dennis et al., 2010; Hoffman et al., 1996; Korgaonkar and Wolin, 1999; Weiser, 2000; Yang and Wu, 2006). However, despite the evidence suggesting that online patronage preference has a substantial connection with consumer characteristics, results in some empirical analysis (e.g., Hernández et al., 2011) showed that the direct effects of consumer characteristics on online purchase preference to be somewhat tenuous. Although these two findings to be some difference, it is possible that consumer characteristics impact online purchase preference by moderating other elements, such as the objectives of saving money and time (Punj, 2012).

In this section, we review salient literature that grounds our hypotheses, which describe several predictions regarding how consumer characteristics moderate time-related effects (i.e., shopping-time-saved and delivery time) on online

purchase preference. Because there is little theoretical work on exploring the above research question, we base our hypotheses largely on extant empirical works and other relevant researches in this domain (e.g., Goolsbee and Klenow, 2006; Punj, 2012).

Many theoretical works have noted that while women did most of the shopping in traditional market like high street, Internet shopping tended to be dominated by male shoppers (Bae and Lee, 2011; Dennis et al., 2010; Slyke et al., 2002). Given this observation, many works have explored the cause of this gender difference. According to the research of Okada and Hoch (2004), it is shown that male have a relatively high information processing ability than female, which can help them to reduce the cost of search (e.g., saving time) in Internet shopping. In addition, some empirical studies also have suggested that male consumers value their time to a greater degree than female do because men usually focus on the outcome of shopping activities rather than the shopping process (Chang et al., 2004; Sebastianelli et al., 2008; Zhou et al., 2007). For this finding, one possible explanation is that whereas men may make purchases out of need, women have an innate love for shopping which incites them to ignore the time they spend shopping. Therefore, we posit that gender factor moderates both the effects of shopping-time-saved and delivery time on patronage preference for Internet retailers, which leads to the following hypotheses:

*H1: The respective effects of shopping-time-saved and delivery time on online purchase preference are more pronounced for men than for women.*

From the perspective of economic, income affects the valuation of time. Punj (2012) indicated that income positively affects customer's preference to save time in their purchasing activities but negatively affects the preference to save money, i.e., higher-income consumers place a greater value on their time than money, while low-income consumers place a greater value on their money than time. It is due to the opportunity cost it represents (Ratchford et al., 2003; Goolsbee and Klenow, 2006). According to the economic theory, the law of diminishing marginal rate of substitution leads higher-income consumers tend to have more interest in the time saving characteristics of Internet shopping. Given these, the increase of income level is considered to intensify the impacts of both shopping-time-saved and delivery time on online purchase preference. The hypothesis in this study, therefore, is stated as follows:

*H2: Both the effects of shopping-time-saved and delivery time on online purchase preference will be intensified by the increase of income level.*

Age and education level are two important factors for predicting consumer buying behav-

ior in Internet shopping. Many studies demonstrated that online shoppers tend to be young and better educated (Bellman et al., 1999; Swinyard and Smith, 2003). In addition, because of the important generational differences in the use of the Internet, Punj (2012) pointed out that generational age potentially moderates the effects of mental accounts on online purchase goal of saving time. Although that study only discussed the moderating effects of age on the positive relationship between income level and the importance of saving time in Internet shopping, we posit that it (i.e., age) has a similar moderating effect on the importance of time and patronage preference for Internet retailers.

According to the theory of consumer information processing (Bettman, 1979; Howard, 1994), educational level has a direct effect on consumer's ability to process information (Henry, 1980; Hult et al., 2004). Some previous researches like Beatty and Smith (1987) and Punj (2012) indicated that consumers with more education are more likely to engage in an extended search for information to minimize the cost of time or balance time spent with money saved. And also, many studies have showed that the education level has a strong correlation with people's income (Bellman et al., 1999; Levin et al., 2005; Lohse et al., 2000), which suggest education may also moderates time-related effects on online purchase preference. For these findings, this paper considers that education level also intensifies the respective effects of shopping-time-saved

and delivery time on online purchase preference to some extent.

Considering these likely influences, hypotheses are proposed as follows:

*H3: The respective effects of shopping-time-saved and delivery time on online purchase preference are more pronounced for younger consumers than for senior consumers.*

*H4: The effects of shopping-time-saved and delivery time on online purchase preference are more pronounced for consumers who are better educated.*

In addition to the hypotheses summarized above, many empirical studies also have focused on the distinctions of consumer online patronage preference in different countries or regions (Brashear et al., 2009; Gong, 2009; Ng, 2013; Ye et al., 2013), because some prior studies, like Comor (2000), have indicated that national or regional differences is one of important indicators related to consumer buying behavior in Internet shopping. However, most of these studies putting more emphasis on the differences between culture, and life-style, but they neglected to explore the differences on the attitude toward time. In actual fact, related to this, some nation-specific e-commerce platforms publicize their respective merits: for example, Amazon advertises its "Prime"

service;<sup>2)</sup> Rakuten advertises “Asuraku,”<sup>3)</sup> and Taobao focuses on discount. These scenarios show that consumers in different countries or regions may possess divergent attitudes related to time and Internet shopping. One of the explanations is for the high opportunity cost of time because of the relatively high income (Goldman and Johansson, 1978; Ratchford et al., 2003). The other may stem from the differences in industry development and national cultural (Ng, 2013; Ye et al., 2013).

Given the influence of geographic region, we predict that consumers in developed countries will show more interest in saving time than consumers in developing country. As a result of this assumption, we offer the following hypothesis:

*H5: The degrees of time-related effects on online purchase preference are more pronounced for consumers in advanced countries than consumers in less-advanced countries.*

According to consumer behavior theory of Sheth (1983), life-style is also a very important part of personal characteristics of shoppers. A number of scholars have demonstrated that Internet shoppers have more Internet experience but less discretionary time than offline shoppers do in their empirical studies (Bellman et al., 1999;

Levin et al., 2003; Levin et al., 2005; Lohse et al., 2000). As such, previous experience with e-commerce is regarded as a critical predictor of a consumer’s perceptions of risk related to Internet shopping (Samadi and Nejadi, 2009). Relatedly, some researchers also consider delivery time to be associated with perceived risk given the anxiety that can arise as a result of delayed arrival (Forsythe and Shi, 2003; Salam et al., 2003). Therefore, we surmise that individuals with extensive online experience attach little importance to delivery. That said, time-starved people tend to value their time more than those with extensive time resources do (Bellman et al., 1999; Lohse et al., 2000). Economic theory stipulates that consumers will balance time-related costs on the basis of the economic value they place on that time (Punj, 2012). This suggests that consumers with little time tend to be interest in saving time, as the economic value of that time is greater than the value of time for those who possess substantial time resources. Given this, we offer the following hypotheses:

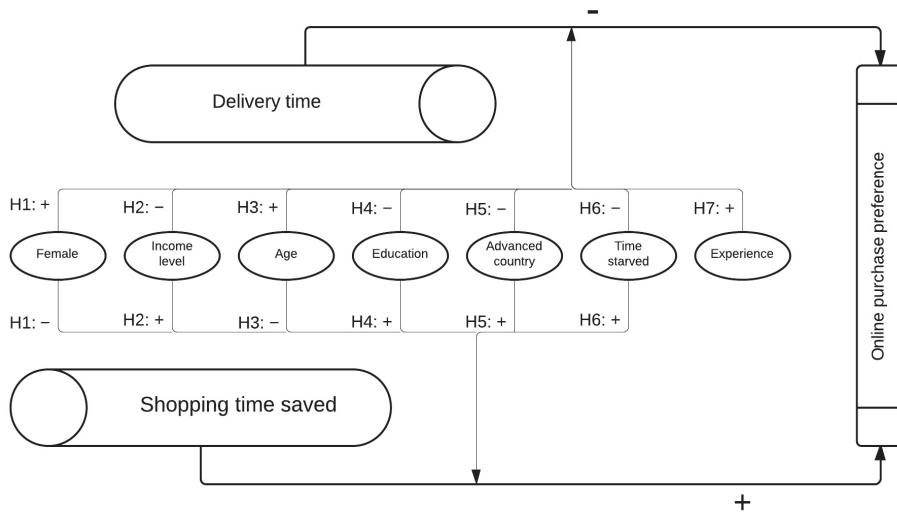
*H6: The degrees of time-related effects on online purchase preference are more pronounced for consumers who have less discretionary time than for consumers who have more.*

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2) Prime is a premium service offered by Amazon, which features fast shipping and free shipping.

3) Asuraku is a premium service offered by Rakuten, which allows consumers to receive their orders the following day.

<Figure 1> Research hypotheses



*H7: The negative effect of delivery time (i.e., perceived risk of delivery time) on online purchase decision is weaker for shoppers who have abundant experiences of online shopping.*

With Figure 1, we offer a visual representation of our research hypotheses.

### III. Methodology

In this section, we describe the processes through which we collected data and constructed

a choice model to analyze that data.

#### 3.1 Data collection

To collect data for this study, we designed and employed an anonymous survey to determine consumer preferences for online/offline purchase. Five categories of goods have been used to control the products bias, in which the purchase quantities are the biggest on the Internet.<sup>4)</sup> We administered this survey via several survey websites to a sample of respondents from the United States, Japan, and China from April 2010 to June 2012.<sup>5)</sup> The survey was constructed in a number of interrelated parts. These

4) Five categories include "Apparel/Accessories", "PC/Hard device", "Book/CD/Software", "Personal care" and "TV/Home appliance."

5) These survey websites include:

--- SOJUMP (<http://www.sojump.com/>),

--- Google Consumer Surveys (<http://www.google.com/insights/consumersurveys/home>),



parts were comprised as follows:

*Part 1: Contents, objective, notes, and term explanations.*

*Part 2: Items related to consumer gender, age, country, education, income, and working days. Items related to working days were included to serve as a proxy for working time.*

*Part 3: Items related to previous experiences concerning online shopping, including the frequency with which the respondent engages in online shopping per month.*

*Part 4: Items related to consumer patronage preferences for Internet or local retailer. In this part, participants were required to respond on the basis of Stated Preference,<sup>6)</sup> which contained several market factors (e.g., price, time). We utilize Stated Preference data in this study because Revealed Preference data is typically inaccessible.*

We collected the initial sample for this study in July 2012. Of the 3058 responses returned, 1847 (60.4%) were valid. To investigate the effect of time on consumer preferences for online purchase, we used the entire valid sample of

1441 respondents except those who chose “either.”<sup>7)</sup> Among them, respondents collected from the United States, Japan, and China were 462 (32.1%), 488 (33.9%) and 491 (34.1%), respectively. Table 1 provides the descriptive statistics related to the sample; Table 2 outlines a summary of the participants’ responses.

These tables demonstrate that 62.2% of respondents prefer to shop online while 37.8% of respondents prefer to shop in physical stores. In addition, although 55% of all respondents were male, the ratio of males in the online purchase group was somewhat higher. Respondents were nearly evenly split between the United States, Japan, and China. The modal “Age” category was 30s, but consumers in the online purchase group skewed slightly younger than the group of respondents that preferred to shop in physical stores. Similarly, the modal “Education” category was college education or above for the online purchase group, demonstrating that more-educated consumers prefer to make their purchases online. Also in these tables, although the difference of income in two groups was not such significant, we noticed that Consumers who are time-starved exhibit a greater tendency towards purchasing online.

We checked sample bias by comparing our sample to those used in extant research in this

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--- DiaoChaPai (<http://www.diaochapai.com/>),

--- QQSURVEY (<http://www.1diaocha.com/>).

6) Stated Preference data relates to stated intention preference and is typically considered to be opposite to Revealed Preference data.

7) Participants were asked where they go to purchase, with options including “online”, “in-shop”, and “either.”

<Table 1> Descriptive statistics (N=1441)

Name	Explanation	Unit	Mean	Std.Dev.	Min	Max
Price_in-shop	Selling price on physical stores	US dollars	147.0	210.9	3.3	1048.8
Price_online	Selling price on Internet	US dollars	135.1	192.7	3.2	886.1
Time_in-shop	Shopping time in in-shop purchase	Hours	2.9	1.6	0.5	7.5
Time_online	Shopping time in Internet purchase	Hours	1.3	0.5	0.5	2.5
Delivery time	Delivery time in Internet purchase	Days	3.6	1.9	1.0	9.0
Gender	1 if female; 0 if male	---	0.4	0.5	0.0	1.0
Age	The age of the consumer	Years	32.4	11.3	16.0	62.0
Education	1 if college or above; 0 otherwise	---	0.6	0.5	0.0	1.0
Income	Monthly income	US dollars	2869.7	1917.4	174.2	8945.1
Japanese	1 if Japanese; 0 otherwise	---	0.3	0.5	0.0	1.0
American	1 if American; 0 otherwise	---	0.3	0.5	0.0	1.0
Working days	Working days per week	Days	4.4	1.0	1.0	6.0
Frequency	Frequency of shop online per month	Times	4.4	4.3	1.0	19.0

Note: All prices have been converted to US dollars

<Table 2> Response distributions

Individual attribute		Purchase in-shop	Purchase online
Gender	Male	281 (51.6%)	518 (57.8%)
	Female	264 (48.4%)	378 (42.2%)
Nationality	China	191 (35.1%)	300 (33.5%)
	Japan	178 (32.7%)	310 (34.6%)
	USA	176 (32.3%)	286 (31.9%)
Age	- 20	22 (4.0%)	46 (5.1%)
	20 - 29	100 (18.4%)	195 (21.8%)
	30 - 39	200 (36.6%)	316 (35.3%)
	40 - 49	124 (22.8%)	233 (24.9%)
	50 -	99 (18.2%)	116 (13.0%)
Education	College or above	227 (41.7%)	550 (61.4%)
	Otherwise	318 (58.3%)	346 (38.6%)
Income	Less than 1499	136 (25.0%)	227 (25.3%)
	1500 - 2499	133 (24.4%)	229 (25.6%)
	2500 - 3499	142 (26.1%)	248 (27.7%)
	More than 3500	134 (24.6%)	192 (21.4%)
Work	Less than 2 days	37 (6.8%)	54 (6.0%)
	3 - 4 days	266 (48.8%)	364 (38.6%)
	More than 5 days	242 (44.4%)	496 (55.4%)
Total		545	896

Note: Column percentage is presented in brackets.

domain (Hernández et al., 2011; Punj, 2012; Wan et al., 2012; y Monsuwé et al., 2004). Through this comparison, we found that the sample used in this study was very similar to samples used in past studies in terms of demographics and regional characteristics.

### 3.2 Choice model

Suppose that the respective total costs of in-shop and online purchases are  $C(1)$  and  $C(2)$ . According to the cost minimization principle, consumer purchase preferences for shopping online in this study can be calculated as follows:

$$\begin{aligned} & \textit{Purchase preferences for shopping online:} \\ & C(1) - C(2) + e > 0 \end{aligned}$$

The  $e$  in each formula represents residual error. Given these, consumer preferences are more easily identifiable when  $C(1)$  and  $C(2)$  are more substantially different.

We assume that there exists a probability  $p_{1i}$  that consumer  $i$  will make an online purchase. Similarly, we assume that there is a probability  $p_{0i}$  that consumer  $i$  will make an offline purchase. In this model, the error term  $e_i$  obeys a logistic distribution. The respective probabilities of online purchase can be expressed as:

$$p_{1i} = \frac{1}{1 + \exp(-\mathbf{X}_i \mathbf{b}_i)} = \frac{\exp(\mathbf{X}_i \mathbf{b}_i)}{1 + \exp(\mathbf{X}_i \mathbf{b}_i)}$$

Furthermore,  $\mathbf{X}_i$  and  $\mathbf{b}_i$  respectively represent the vectors for exogenous explanatory variables and unknown parameters for consumer  $i$ .

Given the above definitions, we formed the following logit model to test our hypotheses:

$$\begin{aligned} \ln(p_{1i}/p_{0i}) = & \beta_0 + (\beta_1 + \mathbf{H}_i \mathbf{b}_1^*) sav\_tim \cdot \\ & + (\beta_2 + \mathbf{H}_i \mathbf{b}_2^*) deli\_1 \\ & + (\beta_3 + \mathbf{H}_i \mathbf{b}_3^*) deli\_2 + \mathbf{H}_i \mathbf{b} + u \end{aligned}$$

$\mathbf{H}_i$  in our model is the vector for consumer characteristics, including gender, age, education level, disposable income, country, work times, and the experience of online purchasing for consumer  $i$ . The interaction terms show the moderating roles of consumer characteristics.

For our model,  $sav\_tim$  represents the difference in shopping time between in-shop and online (i.e., shopping-time-saved);  $deli\_1$  and  $deli\_2$  are two indicator variable related to delivery time, which  $deli\_1$  signifies if a delivery occurs within three days of purchase, and  $deli\_2$  signifies if a delivery occurs four or more days after a purchase (e.g.,  $deli\_1$  equals 3 and  $deli\_2$  equals 2 when delivery time is 5 days. Likewise, if delivery time is 2 days, then  $deli\_1$  equals 2,  $deli\_2$  equals 0).<sup>8)</sup>

In the part of consumer characteristic,  $fe$  is a dummy variable which takes the value of 1 if

8) Through a simulation experiment, we found that the effects of delivery time change dramatically if its value larger than 3.

the consumer is female: *age* is a dummy variable which takes the value of 1 if consumer aged over 45;<sup>9)</sup> *edu* is a dummy variable which takes the value of 1 if the consumer has bachelor degree or above; *inc* is a dummy variable which takes the value of 1 if the standardized value of income in each own country is larger than zero. *JP* and *US* are country dummies which indicate the moderating effect of regional differences; *work* is a dummy variable which takes the value of 1 if a consumer works five days or more per week; and *f3* and *f10* are two dummy variables which indicate the frequency with which a respondent makes online purchases (i.e., between three and ten times, more than ten times) per month.<sup>10)</sup>

#### IV. Analysis of the results

By testing the relationships between consumer characteristics and their patronage preference, we notice that consumer's patronage preference has dependent relationship with gender ( $\chi^2 = 5.36, p < 0.05$ ), age ( $\chi^2 = 9.82, p < 0.05$ ), work times ( $\chi^2 = 16.54, p < 0.01$ ), and shopping experience ( $\chi^2 = 16.88, p < 0.01$ ) indeed. However, through the regression, we found that only the variables of age ( $\beta = -0.45, p < 0.05$ ) and frequency of online shopping (*f3*:  $\beta = 0.42, p <$

$0.01$ ; *f10*:  $\beta = 1.02, p < 0.01$ ) are significant in the logistic regression, while gender, income, education, working days, and country failed to emerge as significant factors for the direct effects on online purchase preference. These results are consistent with the conclusion of Hernández et al. (2011). For these, one possibility is that consumer characteristics may also impact patronage preference through some indirect effects, including moderating some time-related effects.

To investigate how consumer characteristics moderate time-related effects on online purchase preferences, our analysis focuses on the interactions between consumer characteristics and time-related factors.

Table 3 summarizes the estimated results of several logit models and shows the marginal effects at the mean. Because the coefficients in the logit model cannot be directly compared, and the respective effects of time-related variables on online purchase decisions are unobservable with the model, we replace these effects with the marginal effects of the time variables in the likelihood of online purchase to elucidate our analysis results. Using a strict 95% level criterion to indicate statistical significance, we found that shopping-time-saved relate positively to consumer online purchase decision, while delivery time relates negatively.

9) 45 is the upper quartile for age. We assume that consumers who aged over 45 are senior.

10) Similar to the delivery time, three times and ten times in frequency were also calculated by the simulation.

<Table 3> Regression results of logit models (N = 1441)

Variables	Model for H1		Model for H2		Model for H3		Model for H4		Model for H5		Model for H6		Model for H7	
	$\beta$	$\partial P/\partial X$	$\beta$	$\partial P/\partial X$	$\beta$	$\partial P/\partial X$	$\beta$	$\partial P/\partial X$	$\beta$	$\partial P/\partial X$	$\beta$	$\partial P/\partial X$	$\beta$	$\partial P/\partial X$
<i>sav_tim</i>	1.06 ***	13.94%	0.70 ***	11.10%	0.82 ***	12.93%	1.07 ***	13.25%	0.75 ***	11.81%	0.68 ***	9.73%	0.44 ***	7.76%
H1: $\ominus$ <i>sav_tim * fe</i>	-1.05 ***	-13.79%												
H2: $\oplus$ <i>sav_tim * inc</i>			0.13	2.06%	-0.34 **	-5.35%	0.01	0.15%	-0.12	-1.90%				
H3: $\ominus$ <i>sav_tim * age</i>									-0.08	-1.31%				
H4: $\oplus$ <i>sav_tim * edu</i>														
H5: $\oplus$ <i>sav_tim * JP</i>														
H5: $\oplus$ <i>sav_tim * US</i>														
H6: $\oplus$ <i>sav_tim * work</i>														
<i>deli_1</i>	-0.21	-2.71%	-0.23	-3.67%	-0.27	-4.19%	-0.31	-3.82%	-0.25	-3.93%	-0.21	-2.99%	-0.14	-2.41%
H1: $\oplus$ <i>deli_1 * fe</i>	0.12	1.63%												
H2: $\ominus$ <i>deli_1 * inc</i>			-0.22 *	-3.48%	0.18	2.86%	-0.16	-1.93%	-0.41	-6.45%			0.13	2.24%
H3: $\oplus$ <i>deli_1 * age</i>									-0.25	-3.97%			0.14	2.39%
H4: $\ominus$ <i>deli_1 * edu</i>														
H5: $\ominus$ <i>deli_1 * JP</i>														
H5: $\ominus$ <i>deli_1 * US</i>														
H6: $\ominus$ <i>deli_1 * work</i>														
H7: $\oplus$ <i>deli_1 * f3</i>														
H7: $\oplus$ <i>deli_1 * f10</i>														
<i>deli_2</i>	-1.33 ***	-17.47%	-0.81 ***	-12.92%	-0.86 ***	-13.50%	-1.10 ***	-13.64%	-0.67 ***	-10.50%	-0.98 ***	-13.98%	-0.60 ***	-10.66%
H1: $\oplus$ <i>deli_2 * fe</i>	1.08 ***	14.26%												
H2: $\ominus$ <i>deli_2 * inc</i>			-0.34 **	-5.43%	0.14 **	2.24%	-0.16	-1.99%	-0.19 ***	-2.96%			0.18	3.21%
H3: $\oplus$ <i>deli_2 * age</i>									-0.05	-0.85%			0.29 **	5.03%
H4: $\ominus$ <i>deli_2 * edu</i>														
H5: $\ominus$ <i>deli_2 * JP</i>														
H5: $\ominus$ <i>deli_2 * US</i>														
H6: $\ominus$ <i>deli_2 * work</i>														
H7: $\oplus$ <i>deli_2 * f3</i>														
H7: $\oplus$ <i>deli_2 * f10</i>														
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
LR chi2	771.93	541.45	549.16	533.28	547.88	679.11	547.88	547.88	547.88	547.88	679.11	416.40	416.40	416.40
Log likelihood	-569.68	-684.92	-681.06	639.00	-681.70	-681.06	639.00	639.00	-681.70	-681.70	-616.09	-747.44	-747.44	-747.44
Pseudo R2	0.40	0.28	0.29	0.34	-0.29	0.36	0.34	0.34	-0.29	-0.29	0.36	0.22	0.22	0.22

Note: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$

## 4.1 Results for shopping-time-saved

First, we considered the effect of shopping-time-saved on a consumer's purchase preference for shopping online relative to shopping in a physical store. Table 3 shows that the variable of shopping-time-saved (i.e., *sav\_tim*) significantly and positively impacts preference for online purchasing in all models. This result suggests that a preference for reduced shopping time causes a consumer to be more likely to engage in online purchasing.

This table also demonstrates that the dummy variables for "female" ( $\beta = -1.05, p < 0.01$ ) and "senior" ( $\beta = -0.34, p < 0.05$ ) negatively moderate the effect of shopping-time-saved on online purchase preference. In contrast, the interaction (i.e., slope dummy) between shopping-time-saved and consumer's working days ( $\beta = 0.34, p < 0.05$ ) meant to indicate a consumer who works five days or more per week pays more attention to saving time in Internet shopping. Education, income, and nationality failed to emerge as significant moderators.

One interesting finding produced by these analyses relates to the marginal effect of shopping-time-saved for women (i.e., very close to 0). This finding suggests that female consumers tend to ignore shopping time when making their purchasing decisions. This finding reflects that women have an innate love for shopping which incites them to ignore the time they spend shopping to some extent.

Taken together, these results indicate that consumers who are male, relatively young, and more time-starved exhibit a greater tendency towards saving time with online purchasing behaviors. As a result, our analyses provide support for H1, H3, and H6. We found no evidence to support for H2, H4, and H5.

## 4.2 Results for delivery time

Second, we examined the negative effect of delivery time (i.e., perceived risk of delivery time) on purchasing preference. We divided results associated with delivery time into two types - "delivery within three days" and "delivery in four or more days" according to a simulation result. By splitting the results in this fashion, we observed inconsistent effects associated with delivery time. Although the coefficients for both types of delivery time delay were negative as expected, all coefficients for the analysis related to delivery "within three days" were non-significant. In contrast, results for delivery time that took more than four days demonstrated that all of coefficients were strongly significant ( $p < 0.01$ ). From this, we conclude that consumer preference to engage in online purchasing is heavily influenced if delivery takes more than four days, but is only marginally influenced if delivery takes three or fewer days.

With respect to the interactions between consumer characteristics and delivery time, we noticed that only the variable of income dummy

( $\beta = -0.22, p < 0.10$ ) was shown to be significant for the delivery-time-related effect on consumer's online purchase preference if the delivery occurs within three days. However, all of the moderators (with the exception of education) were shown to be significant for the effect of four-days-or-more delivery on patronage preference for online retailers (see Table 3). Specifically, the dummy variables for "female" ( $\beta = 1.08, p < 0.01$ ), "senior" ( $\beta = 0.14, p < 0.05$ ), and "ten-day frequency" ( $\beta = 0.29, p < 0.05$ ) were significant and positive, while the dummy variables for "the rich" ( $\beta = -0.34, p < 0.05$ ), "Japanese" ( $\beta = -0.19, p < 0.01$ ), and "time-starved" ( $\beta = -0.38, p < 0.01$ ) were negative. In spite of these significant results, neither the coefficient for the US dummy, nor the three-day frequency dummy was statistically significant.

Taken together, these findings suggest that the effect of risk perceptions related to delivery delays on online purchases preference is relatively weak for senior, female, online-experienced shoppers. In contrast, the effect is pronounced for a consumer who is relatively wealthy, and more starved for time. In addition, we also found that Japanese consumers value delivery time to a greater degree than Chinese and American consumers do.

These regression results largely support our hypotheses. These results can be expressed as seven conclusions. First, the effects of shopping-time-saved and delivery time on online

purchase preference are stronger for males than for females. Second, both the effects of shopping-time-saved and delivery time on patronage preference for online retailers are inversely related to the consumer's age. Third, relative to low-income consumers, high-income consumers are more sensitive to delivery time. The groups are roughly equal in terms of shopping time. Fourth, Japanese online consumers place greater value on delivery time than Chinese and American online consumers. Fifth, consumers who have less discretionary time attach greater importance to the role of time as it relates to Internet shopping. Sixth, having engaged in online shopping in the past attenuates consumers' perceptions of risk related to delivery time. Finally, although education moderates the respective relationships between time-related variables and online purchase preference, this moderating effect is marginal, at most. It is probably because that with the fast increasing of the network information and the scale of Internet user continuing to expand, the difference on academic background has become smaller and smaller (Burkolter and Kluge, 2011; Mosteller et al., 2014).

## V. Conclusions and discussion

In this study, we have explored how consumer characteristics moderate time-related effects (i.e., shopping-time-saved and delivery

time) on purchase preference for shopping online. We performed this examination through the development and administration of a survey, of which 1441 valid responses were returned. On the basis of the analyses we performed on this survey data, we found that the impacts of consumer characteristics on online patronage preference mainly reflect in their interactions with time-related factors rather than themselves, meaning customer characteristics moderate those time-related effects on online purchase preference indeed. Specifically, results of logistic regressions demonstrate that both the effects of shopping-time-saved and delivery time on online preference are stronger for consumers who are male, relatively young, and have less available time. In addition, we found that the effect of delivery time on online purchasing behavior is augmented by disposable income, but attenuated by past experience with online shopping. Moreover, we found that Japanese consumers place greater value on delivery time than their Chinese and American counterparts. These findings are largely in accordance with those reported by existing literature (e.g., Punj, 2012).

One of the most interesting findings generated by our analyses suggests that relative to males, females pay little attention to shopping time when deciding how to make purchases. One possible explanation for this finding is that whereas men may make purchases out of need, women have an innate love for shopping which incites them to ignore the time they spend

shopping. Meanwhile, because of with a relatively high information processing ability, men can search the information for what they need faster than women. In addition, the analysis results show that the tendency towards saving time in Internet shopping is more pronounced for consumers who have less discretionary time but more disposable income. This result is consistent with the view of Biswas (2004) and Punj (2012) to some extent. It is indicated that shoppers with a substantial amount of disposable income but less discretionary time tend to exhibit a preference towards saving time through Internet-based. This is likely due to the opportunity costs associated with lost time being high for these individuals.

Due to its association with perceived risk in Internet shopping (Forsythe and Shi, 2003), this study also considered the effect of delivery time on the decision to make purchases online. Specifically, we found that the effect of perceived risk of delays in delivery time is more pronounced for affluent shoppers with a substantial amount of disposable income, while it is weaker for consumers who have abundant experiences of online shopping. These findings are largely consistent with those generated in other empirical works (Forsythe and Shi, 2003; Lu et al., 2005; y Monsuwé et al., 2004). According to economic theory, the result of the "income" is drawn because of the law of diminishing marginal rate of substitution, which also leads lower-income consumers to exhibit a



greater tendency towards saving money (Punj, 2012). The result of the “frequency” is attributable to the fact that historical experience can effectively assuage a consumer’s perception of risk (Forsythe and Shi, 2003; Garbarino and Strahilevitz, 2004). In addition, we believe that the tendency of Japanese consumers to value delivery time to a greater degree than their Chinese or American counterparts may result from their own culture and the developed nature of logistic delivery systems in Japan (METI, 2011-2013).<sup>11)</sup>

The primary contribution of this study can be summed up in three points. First, our study used two time indicators, i.e., shopping-time-saved and delivery time, to check the moderating effects of consumer characteristics on time-related effects on online purchase preference. The second point is the identification of consumer characteristics as a moderating force on the relationships between time-related factors and purchase preference for shopping online. This distinguishes it from many extant studies that have chiefly focused on the direct effects of consumer characteristics on patronage preferences (Bellman et al., 1999; Levin et al., 2005). In our study, we reinterpreted the performance of consumer characteristics in purchasing preferences for online and offline from the perspective of moderating effects, and found the impacts of consumer characteristics on on-

line patronage preference mainly reflect in their interactions with time-related factors rather than themselves. In addition, we made some complement explanations to the existing conclusions of Bellman et al. (1999), Levin et al. (2003, 2005), and Hernández et al. (2011). One of the complements is we explained that compared with women, men are more likely to make an online purchase decisions under the conditions that online shopping enables consumers to save times. The third contribution is that we used experimental investigation and Stated Preference data in this study, which improved the possibilities of data collection on some level.

In light of our findings, several important managerial implications can be gleaned from this study. Most notably, managers in the online retail market can adapt their timing and pricing strategies for different market segments. First, in tailoring their advertising strategies, online sellers should emphasize high efficiency in delivering to males, while it may be more effective to advertise shopping environment to females. Second, when marketing to young consumers or office workers, online sellers should focus on selling products that are clearly standardized and for which most key attributes can be reviewed online. The reasoning behind this assertion rests on the notion that “wired” consumers (like young consumers and office workers) typically seek product information online (Girard

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11) Survey on the Current Status of Electronic Commerce, METI (<http://www.meti.go.jp/>)

et al., 2002; Lohse et al., 2000; y Monsuwé et al., 2004). Third, in American online markets like eBay and Amazon, as well as China's Taobao, managers should emphasize product discounts and firm reputation rather than delivery time (Brashear et al., 2009; Ye et al., 2013; Jingfeng, 2011). In contrast, in the Japanese market (e.g., Rakuten), managers would do well to emphasize delivery time, as Japanese consumers value delivery time to a greater degree than Chinese or American consumers. In addition to these, it is better for Internet retailer to provide more information about goods and enhance their reputations to reduce the level of overall perceived risk.

In spite of the findings generated by our analyses, this study does suffer from two key limitations. First, our analyses were focused only on how consumer characteristics moderate the time-related effects on online purchase preference. However, those time-related effects also may be moderated by other, unidentified factors, e.g., product types and retail-outlet attributes (Girard et al., 2010). Second, as a result of deficiencies inherent in Stated Preference data, the moderator effects we identified in our analyses may underestimate. Therefore, future research could benefit from using Revealed Preference data or other objective data to validate the magnitude of those differences.

⟨Received May 26, 2014⟩

⟨Revised July 31, 2014⟩

⟨Accepted August 25, 2014⟩

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