THE MODERATING ROLE OF CONSUMER HETEROGENEITY
ON TWO OBJECTIVES FOR ONLINE PURCHASE: SAVING
MONEY AND SAVING TIME

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Abstract
In this paper, we posit that consumer heterogeneity moderates the respective relationships between two important online purchase objectives of saving money and saving time on online purchase decisions. To explore this relationship, we empirically examine the moderating roles of consumer heterogeneity on the effects of money saved, time saved, and delivery time on purchase decisions. On the basis of analyses performed on data gleaned from an Internet-based survey, we demonstrate that the effects of saving money on preference for online purchase are more pronounced for consumers who are male, relatively young, and much discretionary time, while the effects of saving time are more pronounced for those who are male, younger, less discretionary time and relatively high income. In addition, the effect of delivery time on online purchase 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.

Keywords: consumer heterogeneity, objectives for online purchase, saving money, saving time, online purchase decision, consumer preferences, logit model, marginal effects
1 INTRODUCTION

Given the rapid propagation of the Internet and the widespread popularity of e-commerce, online shopping has penetrated our daily life (Bhuian 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,\(^1\) the Asia/Pacific region provides the greatest potential in the world with regard to growth in e-commerce. Surveys by comScore and CNNIC\(^2\) in China show that there are more than 200 million consumers in US and 250 million in China shop via the Internet in 2013. According to Ye et al. (2013)'s study, the total value of goods sold on eBay in 2011 was $68.6 billion, more than $2,100 every second. And by the end of 2011, Taobao, which has 60 million visitors per day and sells 48,000 products per minute in China, had 500 million registered participants and 800 million products for sale.

As consumer heterogeneity has grown in importance as it relates to e-commerce, the effect of it on consumer's purchasing preferences has received increased attention from researchers and practitioners alike. Many scholars have specifically sought to explore the relationship between consumer's personal attributes and online purchase decisions (Bellman et al., 1999; Levin et al., 2005; Zhang et al., 2012). Most of them have demonstrated that consumer heterogeneity has a substantial influence on online purchase decision (Levin et al., 2005; Lohse et al., 2000; y Monsuwé et al., 2004). Despite these works suggesting that consumer heterogeneity can influence shopping practices, some recent studies have shown that those shopper's characteristics are only marginally significant predictors of consumer tendency to shop online (e.g., Hernández et al., 2011). Although these studies have shown that the relationships between consumer's characteristics and their purchasing decision to be somewhat tenuous, it is considered a possibility that those consumer heterogeneity factors affect the purchasing preferences by moderating other aspects.

According to the literature (Bellman et al., 1999; Okada and Hoch, 2004; Rohn and Swaminathan, 2004), two of the most critical factors related to the growth of e-commerce are the lower cost and the short amount of time online shopping requires relative to shopping at traditional retail outlets. Many researchers have start to identify the effects of consumer heterogeneity on these two important objectives of saving money and saving time in the Internet shopping (e.g., LI and HUANG, 2014; Punj, 2012). Punj (2012) focuses on the effects of income on the relationship between saving time and saving money, and found that income relates positively to saving time as an online purchase goal, while it relates negatively to saving money. LI and HUANG (2014) focuses on the moderating effect of consumer heterogeneity on the respective relationships between time saved and delivery time and consumer decisions related to online purchases. In his paper, it is pointed out that the relationships between time saved and delivery time and online purchase decisions are more pronounced for

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

\(^2\) comScore: (http://www.comscore.com/); CNNIC: (http://www.cnnic.net.cn/)
consumers who are male, young, and more starved for time. Despite the utility of these researches, Punj (2012) neglected to explore the effects of other consumer characteristics factors, and LI and HUANG (2014) did not discussed the importance of saving money in Internet shopping.

The objective of the present study is thus to fill in these research gaps by investigating the moderating effects of consumer heterogeneity on two online purchase objectives of saving money and saving time. We first adopt logistic regression method to estimate the respective effects of money saved, time saved and delivery time on the likelihood of online purchase decision with the control for several consumer's personal attributes, including gender, age, education level, disposable income, nationality, work times, and online purchasing experience. The regression results show that both money saved and time saved relate positively to consumer online purchase decision, while delivery time relates negatively if it takes more than four days. Second, to clarify the moderating roles of heterogeneity, our study examines the nature of the interaction between the above consumer heterogeneity and the factors of two online purchase objectives. We find that most of the consumer characteristics have significant moderating effects indeed.

This study contributes to the existing literature in two ways. The main contribution of this paper is we reinterpret the performance of consumer's personal attributes in purchasing preferences for online and offline from the perspective of moderating roles on time. Unlike previous studies which have focus on the direct effects of consumer heterogeneity on purchasing preferences, the present paper discusses the moderating effects of consumer heterogeneity on the respective relationships between money-saving and time-saving and consumer decisions related to online purchase. 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). Another one 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.

The rest of the paper is organized as follows. Section 2 features a review of salient literature that grounds the key hypotheses. Section 3 describes our research methodology, including the data collection practices and the model. Section 4 reports 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.

2 LITERATURE REVIEW AND HYPOTHESES

With the rapid development of Internet shopping, many survey researches observed that most of consumers focus either on saving time or saving money while shopping online in past two decades, (e.g., Horrigan, 2008). A great number of studies have demonstrated that saving money and saving time are two relative important objectives that most consumers identify as reasons for shopping online, because shopping online normally enables consumers to save money and time than shopping in

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3 Work times in the present paper means the number of workdays a week.
traditional retail outlets. Among them, Bellman et al. (1999) and Rohm and Swaminathan (2004) indicated that shopping on the Internet could cut back on many time-consuming activities associated with traditional shopping. Punj (2012) noted that the money saving potential of the Internet is another important reason for shopping online. Despite many studies have revealed that online shopping usually allows consumers to save money or time, the need for goods purchased on the Internet to be physically delivered incurs a time cost on the consumers, because delivery of goods procured through Internet purchases require additional time due to delayed arrival (Liao and Keng, 2013; Ryan and Valverde, 2005). Therefore, we reason that money and time saved positively affect consumer's preference for online purchase, while delivery time affect negatively.

On the other hand, a number of studies have focused on what types of consumers are most likely to be purchased online (Bellman et al., 1999; Levin et al., 2005; Lohse et al., 2000; y Monsuwé et al., 2004), because many of them found that consumer's personal attributes has a substantial influence on their purchasing preferences indeed (e.g., Levin et al., 2005; Lohse et al., 2000). Unlike in-store shopping, which is traditionally performed by females, males form the majority of Internet shoppers (Dennis et al., 2010; Hoffman et al., 1996; Korgaonkar and Wolin, 1999; Weiser, 2000; Yang and Wu, 2006). Additionally, Bellman et al. (1999) and Swinyard and Smith (2003) have identified that those Internet shopper as being younger, wealthier, better educated, more computer literate, and more likely to spend time on the computer than offline shoppers are. However, despite the evidence suggesting that consumer heterogeneity can influence shopping practices, some of recent empirical studies argued that partial of those characteristics elements were barely significant for consumers to shop online (Al-SomaLI and HUANG, 2009; Hernández et al., 2011; Roussos, 2007). Given these arguments, a number of scholars have turned their focus on not only the direct effects of these consumer heterogeneity on the preference for online purchase, but also on the moderating (or mediating) effects (Bae and Lee, 2011; Kwon et al., 2014).

Based on these findings, we predict that the characteristics of Internet shoppers could also moderate the respective relationships between two online purchase objectives of saving money and saving time, and consumer decisions related to online purchase. In this section, therefore, we review salient literature that grounds our hypotheses, which describe several predictions regarding the moderating role of consumer characteristics on these two important objectives. Since there is little theoretical work on exploring the respective relationships between consumer heterogeneity and the relative importance of saving money and time, we base our hypotheses largely on extant empirical work in this domain (e.g., Goolsbee et al., 2006; LI and HUANG, 2014; 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 a survey by METI, 4 it is shown that money saving is stated as

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4 Survey on the Current Status of Electronic Commerce, METI (http://www.meti.go.jp/)
the leading cause of shopping online by male consumers. In addition, LI and HUANG (2014) found that the respective effects of time saved and delivery time on online purchase decisions are more pronounced for men than women. Some of other empirical study also suggested that men value their time to a greater degree than women do because men focus on the outcome of shopping activities rather than the shopping process (Chang et al., 2004; Sebastianelli and HUANG, 2008; Zhou et al., 2007). One possible explanation for these findings 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 offer the following hypothesis:

**H1: Male consumers exhibit a greater tendency toward saving money and saving time than female consumers do.**

From the perspective of economic, income affects the valuations of cost and time. Punj (2012) indicated that income positively affects a 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, while low-income consumers place a greater value on their money. It is due to the opportunity cost it represents (Ratchford et al., 2003; Goolsbee and Klenow, 2006). In the empirical analysis of LI and HUANG (2014), it is pointed out that the effect of delivery time on online purchase decisions is positively moderated by income level but the difference in the effect of time saved is weak. 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, while lower-income consumers tend to have more interested in saving money. Given these, the increase of income level is considered to increase the impact of saving time but decrease the impact of saving money on consumer's online purchase decision. The hypothesis in this study, therefore, is stated as follows:

**H2: Income relates positively to saving time as an online purchase goal, while it relates negatively to saving money.**

Because of the important generational differences in the use of the Internet, Punj (2012) pointed out that generational age potentially moderates the effect of mental accounts on online purchase goals of interest, which includes saving money and saving time. Although he focused on the moderating role of age on the positive relationship between income and saving time, we posit that it have similar effect on the relationship between saving time and consumer decisions related to online purchases. Additionally, previous research (Beatty and Smith, 1987; Punj, 2012) has found that consumers with more education are more likely to engage in an extended search for information and make greater use of price information. Given that the positive correlation between education and income (Bellman et al., 1999; Levin et al., 2005; Lohse et al., 2000), it is possible that education also moderates the two important online purchase objectives of saving money and saving time. As such, we posit that age and education level also influence the respective effects of saving money and saving time on the decision of purchasing online. Considering these likely influences, hypotheses are proposed as follows:
H3: The positive effect of saving time on online purchase decisions is more pronounced for younger consumers than for older consumers.

H4: Two positive effects of saving money and saving time on online purchase decisions are stronger for shoppers with more education in comparison to those with less education.

In addition to the hypotheses summarized above, regional differences may also moderate the respective relationships between saving money and saving time and online purchase decisions (Comor, 2000; LI and HUANG, 2014). A number of studies have focused on the effect of regional differences on Internet shopping (Brashear et al., 2009; Gong, 2009; Ng, 2013; Ye et al., 2013). Although these studies have shown that geographic region affects online consumer purchasing behavior, they neglected to explore the moderating effects of saving money and saving time. Related to these, some nation-specific e-commerce platforms publicize their respective merits; for example, Amazon advertises its “Prime” service; Rakuten advertises “Asuraku,” and Taobao focuses on discount. These scenarios show that consumers in different 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 other regions. As a result of this assumption, we offer the following hypothesis:

**H5: Consumers in advanced countries exhibit a greater tendency toward saving time than consumers in less-advanced countries do.**

A number of researchers have suggested that Internet shoppers have more Internet experience but less discretionary time than offline shoppers do (Levin et al., 2003, 2005). 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: Discretionary time relates positively to saving money as an online purchase goal, while it relates negatively to saving time.**

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5 Prime is a premium service offered by Amazon which features fast shipping and free shipping.
6 Asuraku is a premium service offered by Rakuten which allows consumers to receive their orders the following day.
3 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’s purchasing preferences. We selected 5 categories, including “Apparel/Accessories”, “PC/Hard device”, “Book/CD/Software”, “Personal care” and “TV/Home appliance”, in which the purchase quantity are the biggest on the Internet. 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. The survey was constructed in a number of interrelated parts, which were comprised as follows:

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

Part 2: Items related to consumer gender, age, nationality, 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 preferences for online/offline purchases. In this part, participants were required to respond on the basis of Stated Preference, which contained several market factors (e.g., price, time). We utilize Stated Preference data in this study because Real 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.”

The descriptive statistics related to the sample demonstrates 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 30 -- 39, 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

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7 These survey websites include SOJUMP (http://www.sojump.com/), Google Consumer Surveys (http://www.google.com/insights/consumersurveys/home), Diaochapai (http://www.diaochapai.com/), and QQSURVEY (http://www.1diaocha.com/).

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

9 Participants were asked where they go to purchase, with options including "online", "in-shop", and "either."
category was college education or above for the online purchase group, demonstrating that more-educated consumers prefer to make their purchases online. We checked sample bias by comparing our sample to those used in extant research in this domain (Hausman and Siekpe, 2009; Pan et al., 2013; 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 preferences in this study can be calculated as follows:

- Consumer preferences for online purchase: \( C(1) - C(2) + \varepsilon > 0 \)
- Consumer preferences for in-shop purchase: \( C(1) - C(2) + \varepsilon < 0 \)

The \( \varepsilon \) 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 \( \varepsilon_i \) obeys a logistic distribution. The probabilities of online purchase can be expressed as:

\[
P_{1i} = \frac{1}{1 + \exp\left(-X_i\beta_i\right)} = \frac{\exp\left(X_i\beta_i\right)}{1 + \exp\left(X_i\beta_i\right)}
\]

Furthermore, \( X_i \) and \( \beta_i \) respectively represent the vectors for exogenous explanatory variables and unknown parameters for consumer \( i \).

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

\[
\ln\left(\frac{p_{1i}}{p_{0i}}\right) = \beta_0 + \left(\beta_1 + H_i\beta_1^*\right) sav_{-mon} + \left(\beta_2 + H_i\beta_2^*\right) sav_{-tim} \\
+ \left(\beta_3 + H_i\beta_3^*\right) deli_{-1} + \left(\beta_4 + H_i\beta_4^*\right) deli_{-2} + H_iB
\]

\( H_i \) and \( B_i \) respectively represent the vectors for the variables of consumer characteristics and unknown parameters for consumer \( i \). Characteristics of consumer in our model include gender, age, education level, disposable income, nationality, work times, and online purchasing experience.

For our model, \( sav_{-mon} \) represents the difference in total shopping costs\(^{10}\) between physical stores and Internet (i.e., money saved); \( sav_{-tim} \) represents the difference in shopping time between in-shop and online (i.e., time saved); \( deli_{-1} \) is an indicator variable that signifies if a delivery occurs within three days of purchase; \( deli_{-2} \) is an indicator variable which signifies if a delivery occurs four or more

\(^{10}\) Total shopping costs include commodity price, transportation costs, shipping, commission charges, etc.
days after a purchase.\textsuperscript{11} In the part of consumer characteristics, \textit{fe} is a dummy variable which takes the value of 1 if the consumer is female; \textit{age} is a dummy variable which takes the value of 1 if consumer aged over 45;\textsuperscript{12} \textit{edu} is a dummy variable which takes the value of 1 if the consumer has bachelor degree or above; \textit{inc} is a dummy variable which takes the value of 1 if the logarithm of the respondent’s income is larger than 8;\textsuperscript{13} \textit{JP} and \textit{US} are nationality dummies which indicate the moderating effect of regional differences; \textit{work} is a dummy variable which takes the value of 1 if a consumer works more than five days per week; and \textit{f}3 and \textit{f}10 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.

Because the effects of mental accounts on the two online purchase goals (i.e., saving money and saving time) of Interest are unobservable with the logit model, we replace these effects with the marginal effects of all related variables in the likelihood of online purchase. The interaction terms show the moderating roles of consumer heterogeneity.

\section*{4 ANALYSIS OF THE RESULTS}

While the results of chi-square tests show that many consumer attributes influence distributions of purchase decision,\textsuperscript{14} we noticed 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. Gender, education, income, and working days failed to emerge as significant factors for the direct effects on online purchase decisions.

Table 1 summarizes the estimated results of several logit models and show the marginal effects at the mean. Because the coefficients in the logit models cannot be directly compared, we use the marginal effects to elucidate our analysis results. Using a strict 95\% level criterion to indicate statistical significance, we found that both money saved and time saved relate positively to consumer online purchase decision, while delivery time relates negatively.

\textbf{(1) Results for saving money}

We considered the relationship between saving money and consumer’s preference for shopping online relative to shopping in a physical store. Focus on the effect of money saved on consumer online purchase decisions, table 1 shows that saved money (i.e., \textit{sav_mon}) significantly and positively affects preference for online purchasing in all models. This result suggests that a preference for reduced the economic cost of shopping causes a consumer to be more likely to engage in online purchasing.

\textsuperscript{11} If delivery is 5 days, then \textit{deli} 1 is 3, \textit{deli} 2 is 2. If delivery time is 2 days, then \textit{deli} 1 is 2, \textit{deli} 2 is 0.
\textsuperscript{12} 45 is the upper quartile for age. We assume that consumers who aged over 45 are older.
\textsuperscript{13} 8 is the upper quartile for the logarithm of income. We assume that consumers whose disposable income is greater than \( e^{8} \) are high-income consumers.
\textsuperscript{14} By using chi-square test, gender (chi2 = 5.36, \( p < 0.05 \)), age (chi2 = 10.61, \( p < 0.05 \)), and education (chi2 = 53.11, \( p < 0.01 \)) significantly influence the distributions of purchase decision.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Model for H1</th>
<th>Model for H2</th>
<th>Model for H3</th>
<th>Model for H4</th>
<th>Model for H5</th>
<th>Model for H6</th>
<th>Model for H7</th>
</tr>
</thead>
<tbody>
<tr>
<td>sav_mon</td>
<td>β</td>
<td>∂P/∂X</td>
<td>β</td>
<td>∂P/∂X</td>
<td>β</td>
<td>∂P/∂X</td>
<td>β</td>
</tr>
<tr>
<td>H1: sav_mon * fe</td>
<td>0.22 ***</td>
<td>2.78%</td>
<td>0.14 ***</td>
<td>2.16%</td>
<td>0.17 ***</td>
<td>2.08%</td>
<td>0.21 ***</td>
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<tr>
<td>H2: sav_mon * inc</td>
<td>-0.12 ***</td>
<td>-1.52%</td>
<td>-0.10 ***</td>
<td>-1.66%</td>
<td>0.04</td>
<td>0.49%</td>
<td>-0.12 ***</td>
</tr>
<tr>
<td>H4: sav_mon * edu</td>
<td>-0.32 **</td>
<td>-5.14%</td>
<td>0.10</td>
<td>1.23%</td>
<td>0.13</td>
<td>2.14%</td>
<td>-0.02</td>
</tr>
<tr>
<td>H6: sav_mon * work</td>
<td>0.12</td>
<td>0.49%</td>
<td>0.74 ***</td>
<td>10.40%</td>
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<tr>
<td>sav_tim</td>
<td>1.32 ***</td>
<td>16.68%</td>
<td>0.50 ***</td>
<td>7.91%</td>
<td>0.69 ***</td>
<td>11.01%</td>
<td>0.75 ***</td>
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<tr>
<td>H1: sav_tim * fe</td>
<td>-0.80 ***</td>
<td>-10.11%</td>
<td>0.21 **</td>
<td>3.30%</td>
<td></td>
<td></td>
<td>0.15 **</td>
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<tr>
<td>H2: sav_tim * inc</td>
<td>-0.32 **</td>
<td>-5.14%</td>
<td>-0.32 **</td>
<td>-5.14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H3: sav_tim * age</td>
<td>0.10</td>
<td>1.23%</td>
<td>-0.22</td>
<td>-3.49%</td>
<td></td>
<td></td>
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<tr>
<td>H4: sav_tim * edu</td>
<td>0.13</td>
<td>2.14%</td>
<td>-0.22</td>
<td>-3.49%</td>
<td></td>
<td></td>
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<tr>
<td>H5: sav_tim * JP</td>
<td>0.74 ***</td>
<td>10.40%</td>
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</tr>
<tr>
<td>H6: sav_tim * US</td>
<td>0.22</td>
<td>3.49%</td>
<td>-0.24</td>
<td>-3.34%</td>
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<tr>
<td>H7: deli_1 * JP</td>
<td>0.02</td>
<td>0.35%</td>
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<td>H8: deli_1 * f10</td>
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<td>1.08%</td>
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<tr>
<td>deli_2</td>
<td>1.17 ***</td>
<td>14.81%</td>
<td>-0.60 ***</td>
<td>-9.53%</td>
<td>-0.55 ***</td>
<td>-8.84%</td>
<td>-0.65 ***</td>
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<td>H1: deli_2 * fe</td>
<td>0.89 ***</td>
<td>11.21%</td>
<td>-0.39 **</td>
<td>-6.18%</td>
<td>0.19 **</td>
<td>3.00%</td>
<td>-0.17 ***</td>
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<tr>
<td>H2: deli_2 * inc</td>
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<td>-6.18%</td>
<td>0.19 **</td>
<td>3.00%</td>
<td>-0.13</td>
<td>-1.59%</td>
<td>-0.05</td>
</tr>
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<td>H3: deli_2 * age</td>
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<td>-1.59%</td>
<td>-0.17 ***</td>
<td>-2.71%</td>
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<tr>
<td>H4: deli_2 * edu</td>
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<td>-8.79%</td>
<td></td>
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</tr>
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<td>H5: deli_2 * JP</td>
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<tr>
<td>H6: deli_2 * US</td>
<td>0.20</td>
<td>3.12%</td>
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</tr>
<tr>
<td>H7: deli_2 * f10</td>
<td>0.28 ***</td>
<td>4.34%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR chi2</td>
<td>806.06</td>
<td>534.21</td>
<td>537.62</td>
<td>534.21</td>
<td>537.94</td>
<td>691.55</td>
<td>565.62</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-552.61</td>
<td>-688.54</td>
<td>686.83</td>
<td>-684.92</td>
<td>-686.67</td>
<td>-609.87</td>
<td>-672.83</td>
</tr>
<tr>
<td>Pesudo R2</td>
<td>0.42</td>
<td>0.28</td>
<td>0.28</td>
<td>0.33</td>
<td>-0.29</td>
<td>0.36</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Table 1: Regression results of logit models (N = 1441)

Note: *** p < 0.01; ** p < 0.05; * p < 0.1
Related to the moderating role of consumer heterogeneity on the relationship between saving time and purchasing decisions, we offered four hypotheses (i.e., H1, H2, H4, and H6) in Section 2. From the regression results of logit models, we noticed that the dummy variables for gender ($\beta = -0.12, p < 0.01$), age ($\beta = -0.10, p < 0.05$), and work times ($\beta = -0.12, p < 0.05$) negatively moderate the causality between “shopping cost saved” and preference for online purchasing. In contrast, the dummy variable for education ($\beta = 0.04$) relates positively to this relationship. By checking the significance of the results, we found that the moderating effect of education seemed to be non-significant (i.e., $p = 0.24$) and the marginal effect is closed to zero, though its coefficient is consistent with our expectation.

Given these results, we found that consumers who are male, relatively young, and much discretionary time exhibit a greater tendency towards saving money with online purchasing behaviors. As a result, Most of the hypotheses related to saving money are supported by our analysis, except H4.

(2) Results for saving time

We measure the moderating role of consumer heterogeneity on the objective of saving time in Internet shopping from two perspectives, i.e., shopping time saved, and delivery time.

First, we focused on the effect of shopping time on consumer decisions related to online purchases. Same tendency and influence as the result of money saved, table 1 demonstrates that saved time (i.e., $sav\_tim$) also significantly and positively affects consumer's online purchase decisions in all models. This result suggests that a preference for reduced shopping time also causes a consumer to be more likely to engage in online purchasing behaviors.

From the above table, we noticed that the dummy variables for gender ($\beta = -0.08, p < 0.01$) and age ($\beta = -0.32, p < 0.05$) negatively moderate the relationship between “shopping time saved” and preference for online purchasing. In contrast, the dummy variable for income ($\beta = 0.21, p < 0.05$) and work times ($\beta = 0.74, p < 0.01$) meant to indicate a consumer’s value of his/her time positively moderates this relationship. Education and nationality failed to emerge as significant moderators.

One interesting finding produced by these analyses relates to the marginal effect of time saved for women (i.e., very small). This finding suggests that female consumers tend to ignore shopping time when making their purchasing decisions.

These results show that consumers who are male, younger, less discretionary time but more high income exhibit a greater tendency towards saving time with online purchasing behaviors. As a result, our analyses provide support for H1, H2, H3, and H6. We found no evidence to support for H4, or H5.

Second, we examined the negative effect of delivery time on purchasing decisions. We referenced some literature (e.g., Liao and Keng, 2013) and divided results associated with delivery time into two types -- delivery within three days and delivery in four or more days. 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 are negative, almost all of coefficients related to delivery “within
three days” are non-significant. In contrast, results for delivery time that took more than four days demonstrated that all of coefficients were strongly significant. These results suggest that shopper 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 heterogeneity and delivery time, all of the interaction terms were shown to be insignificant for the relationship between three-day delivery and preference of online purchase. However, most moderators (with the exception of education) were shown to be significant for the relationship between four-days-or-more delivery and preference for online purchase. Specifically, the dummy variables for gender ($\beta = 0.89, p < 0.01$), age ($\beta = 0.19, p < 0.05$), and ten-day frequency ($\beta = 0.28, p < 0.01$) are significant and positive, and others were negative. In spite of these significant results, neither the coefficient for the US region, nor the three-day frequency dummy is statistically significant.

Taken together, these findings suggest that the effect of risk perceptions related to delivery delays of online purchases is relatively weak for older, female, online-experienced shoppers. In contrast, the effect is stronger for high-income, Japanese shoppers for whom time is a scarce resource.

These regression results largely support our hypotheses. These results can be expressed as seven conclusions. First, the effects of saving money and saving time on the decision to purchase goods online are stronger for males than for females. Second, relative to low-income consumers, high-income consumers are more sensitive to saving time in Internet shopping. Third, the effects of saving time on the decision to purchase goods online are inversely related to the consumer’s age. Fourth, Japanese online consumers place greater value on delivery time than Chinese and American online consumers. Fifth, consumers who have more discretionary time and less disposable income exhibit a greater tendency towards saving money, while those who are “income rich and time poor” find online shopping to be attractive because it saves time. 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 saving money and saving time and online purchase decisions, this moderating effect is marginal, at most.

5 CONCLUSIONS AND DISCUSSION

In this study, we have explored the moderating role of consumer heterogeneity on two objectives (i.e., saving money and saving time) for online purchase. 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 customer heterogeneity indeed moderates the respective relationships between the online purchase objectives of saving money and saving time and consumer decisions related to online purchases. Specifically, analysis results indicate that the effects of saving money on preference for online purchase are stronger for consumers who are male, relatively young, more educated, and much discretionary time. Meanwhile, the effects of saving
time are stronger for consumers who are male, younger, less discretionary time but relatively high income. In addition, we found that the negative 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 consistent with the results of Punj (2012).

One of the most interesting findings generated by our analyses suggests that relative to females, males pay large attention to shopping cost and 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. In addition, the analysis results show that consumers who have more discretionary time and less disposable income exhibit a greater tendency towards saving money in Internet shopping, while the tendency towards saving time is more pronounced for consumers who are “income rich and time poor”. This result is consistent with the views of Biswas (2004) and Punj (2012). 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 Shi, 2003), we 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. This effect is weaker for consumers who have abundant experiences of online shopping. These results are largely consistent with those generated in other empirical work (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 et al., 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 the developed nature of logistic delivery systems in Japan (METI, 2011-2013).

The primary contribution of this study can be summed up in three points. First, our study used two indicators of online purchase objectives, i.e., saving money and saving time, to check the moderating effects of consumer heterogeneity on the relationship between these two important objectives and the decisions related to online purchase. The second point is the identification of consumer heterogeneity as a moderating role. This distinguishes it from many extant studies that have chiefly focused on the direct effect of consumer heterogeneity on consumer preferences (Bellman et al., 1999; Levin et al., 2005). In our study, we reinterpreted the performance of consumer heterogeneity in purchasing preferences for online and offline from the perspective of moderating role. 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). In this paper, we found that the price elasticity for men is stronger than women. Meanwhile, our analysis results 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 money or times. The third contribution is that we used experimental investigation and Stated Preference data, 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 to males, managers should provide clear product information and emphasize short delivery times for their products. 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 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 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 heterogeneity moderates the effect of time-related variables on online purchase decisions. However, this relationship may be moderated by other, unidentified factors (e.g., product category). 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 to validate the magnitude of those differences.

References


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