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Antecedents to loyalty point redemption: Implications for customer equity management☆

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ABSTRACT

This study examines the determinants of member customers' decision to redeem versus accumulate loyalty program (LP) points by focusing on the effects of the different transaction channels (online versus offline) and the demographic information of member customers. This study finds that transactions that occur through online channels and those made by younger customers demonstrate a greater tendency of redeeming LP points as opposed to accumulating them. This study also finds that online channels show a moderating role by mitigating the demographic effects on member customers' point redemption behavior. These findings allow LP providers to predict future LP point balances by analyzing their main transaction channels and the demographic profiles of member customers.

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1. Introduction

Customer equity is critical to a firm's long-term success as customer equity is certain to be the most important antecedent of the long-term value of the firm (Kim, Park, Kim, Aiello, & Donvito, 2012). Firms try to optimize customer equity by retaining existing customers or attracting new customers (Kim, Ko, Lee, Mattila, & Kim, 2014; Sun, Kim, & Kim, 2014). One of most effective tools for customer equity management is a loyalty program (LP), which is a long-term marketing tool that rewards customers' repetitive purchases to enhance their loyalty and boost firms' profitability (Zhanga, Ko, & Kim, 2010). Under LPs, member customers are entitled to either discounts on current purchases through the redemption of LP points or the allotment of LP points for future purchases through the accumulation of LP points.

Running independent LPs entails high fixed costs. Hence, many practitioners shift their focus to partnership loyalty programs (PLPs), which function as a platform through which member companies share. Unlike the members of independent LPs, the member customers of PLPs can redeem or accumulate PLP points at all member stores. Representative examples of PLPs include Air Miles in Canada, T-Point in Japan, Payback in Germany, Nectar in the United Kingdom, and OK Cashbag in Korea (O'Brien & Jones, 1995).

Redemption versus accumulation is the central decision that LP/PLP member customers make, and understanding the point redemption behavior of member customers is critical for the success of LPs/PLPs because the redemption of LP/PLP points implies two contrasting effects on LP/PLP providers. On one hand, the redemption of LP/PLP points suggests that member customers are utilizing the benefits of their membership. Such cases could result in the long-term success of LPs/PLPs through enhanced customer loyalty. On the other hand, most LP/PLP providers recognize membership point balances as a liability and retain a certain portion of such balances as an allowance for debts. In this respect, substantial and unpredictable redemptions made by member customers can increase the costs for LP/PLP providers. Thus, maintaining a desirable membership point balance by predicting the redemption and accumulation patterns of member customers is a key to the success of LPs and PLPs.

Although understanding the mechanism underlying member customers' decision to redeem versus accumulate LP/PLP points is essential for the success of LP/PLP providers, this issue has received scant attention in prior literature. For instance, the existing literature on LP mostly focuses on the impact of LP on (1) customer loyalty, such as behavioral loyalty (Meyer-Waarden, 2007; Noble, Esmark, & Noble, 2014) and attitudinal loyalty (Gomez, Arranz, & Cillan, 2006; Meyer-Waarden & Benavent, 2006); and on (2) the financial performance of firms (Lee, Capella, Taylor, Luo, & Gabler, 2014; Taylor & Neslin, 2005).

Although not directly examining LP/PLP point redemption decisions, the previous literature on coupon redemption behavior is relevant to member customers' decision to redeem versus accumulate LP/PLP points in the sense that both coupons and LP/PLP points are used as a way to promote sales. These studies investigate the determinants

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of consumers' coupon redemption behavior with a focus on the demographic (Chiou-Wei & Inman, 2008; Kwon & Kwon, 2007; Levedahl, 1988), socioeconomic (Demoulin & Zidda, 2009), and psychological (Bawa & Shoemaker, 1987; Lichtenstein, Netemeyer, & Burton, 1990) drivers of coupon redemption. In particular, demographic characteristics have been investigated mainly for profiling purposes in this line of literature.

This study fills the gap in the literature by investigating the determinants of the point redemption behavior of LP/PLP member customers by focusing on the type of transaction channel (i.e., online versus offline) and demographic variables (e.g., age, gender, and income). This study is based on customer-level demographic and transaction data on the OK Cashbag (hereafter referred to as OCB) program, a major PLP in Korea. OCB member customers (hereafter referred to as member customers) are entitled to receive points that are determined as a fixed portion of their purchase amounts from an OCB affiliate member stores (hereafter referred to as member stores). A member customer who purchases at a member store can simply accumulate or redeem points. An interesting characteristic of the OCB program is that both online and offline stores are members of this program, thus enabling us to compare member customers' point redemption behavior between online and offline transaction channels. By contrast, previous studies on coupon redemption behavior focus on coupon redemption made either in an online (Chiou-Wei & Inman, 2008) or an offline setting (Kwon & Kwon, 2007). This study also examines how the type of transaction channel and demographic variables both independently and jointly determine the accumulation versus redemption decision of member customers.

Using both binary logit and group logit models, this study finds that member customers are more likely to redeem LP points through online channels than through offline channels. This study also finds that younger member customers demonstrate a greater tendency to redeem points rather than accumulate them. Finally, this study finds that the online channel mitigates the effect of the demographic information of member customers.

These findings carry managerial implications in three major aspects. First, LP providers can strategically choose their main channel on the basis of the finding that member customers are more likely to redeem LP points through online channels than through offline channels. Second, member customers have different propensities to redeem LP points depending on their demographic characteristics; hence, LP providers should take differentiated approaches to improve the effectiveness of their respective programs for different demographic groups. Finally, findings on the interaction effect in this study suggest that LP providers can proactively control the impact of the demographic characteristics of their member customers by changing the main transaction channel of their LPs.

2. Theoretical foundations and hypotheses

This section builds hypotheses on how the type of transaction channel and demographic variables shape the accumulation versus redemption decision of member customers. Given the limited prior literature on the determinants of the decision to spend LP points, this research draws mainly upon previous studies on the drivers of coupon redemption and deal proneness in constructing the hypotheses. This analogy is used based on the similarity between coupons and LP points in that they are both used as a way to promote sales.

2.1. Online versus offline channels

As member customer can redeem OCB points in both offline and online channels, the OCB program provides a unique empirical context in which one can compare the propensities to redeem points under different transaction channels. Relationships are tightened between retailers and consumers in both online and offline retail environments (Chae, Ko, & Han, 2015; Ortinau, Babin, & Chebat, 2013). This study focuses on the ease of redemption and the accessibility of information in building the hypothesis on the effect of channel type on the propensity to redeem LP points.

Since coupons and LP points are similar ways of promoting sales, relevant insights and implications about LP point redemption behavior can be obtained from the customer behavior associated with coupon redemption and deal proneness. Previous studies on sales promotions that use coupons indicate that the increased inconveniences of visiting offline stores, as reflected in travel distance, lower coupon utilization (Chiou-Wei, 2004; Chiou-Wei & Inman, 2008; Demoulin & Zidda, 2009). This finding implies that an online setting of LP would provide a more direct and convenient setting for consumers to redeem points compared with an offline setting. In addition, Kwong, Soman, and Ho (2011) report that consumers are more likely to redeem than accumulate LP points when they can easily access information on the benefits they can enjoy through redemption. An online channel facilitates an effective infrastructure and user-friendly interface for enhancing customer expertise in efficient shopping by providing various functions and information in real time (Chiou-Wei & Inman, 2008; Strähle, 2013). Promotion redemption in an offline channel is lower than that in an online channel (Zhang & Wedel, 2009). Therefore, LP member customers are more likely to redeem points in an online setting than in an offline setting, given that redeeming and recognizing the benefits of redemption are easier in the former than in the latter. Hypothesis 1: The propensity to redeem points is higher in online transactions than in offline transactions.

2.2. Income

This study considers how the income level of LP member customers shapes their propensity to redeem LP points. Numerous studies on promotions report a positive relationship between coupon proneness and the income of customers (Bawa & Shoemaker, 1987; Kwon & Kwon, 2007; Levedahl, 1988). Regarding this positive relationship, a stream of literature explains that shoppers with high income tend to purchase expensive products that offer extensive deal opportunities and are thus likely to take advantage of such opportunities (Levedahl, 1988). An alternative explanation is that high-income consumers are highly efficient shoppers who possess broad knowledge and great ability to collect, process, and organize market information (Kwon & Kwon, 2007; Levedahl, 1988). In the retail environment, the goal of shopping is not only to acquire the right products but also to find the right products with better deals. Therefore, wealthy customers equipped with high levels of such knowledge are able to plan and utilize deal opportunities. Hypothesis 2: The propensity to redeem points is higher for high-income member customers than for low-income member customers.

2.3. Age

Age has a significant influence on consumer behavior, with older consumers displaying preferences that are different from those of younger consumers (Fay, 1993). Therefore, this study also hypothesizes the relationship between the age of LP member customers and the propensity to redeem. Conventional wisdom suggests that young people are readily exposed to new technologies and trends through their early adopter peers. They are thus able to become more comfortable with new products or promotions. Venkatesh and Agarwal (2006) find that the ease of use is more important to older consumers than to younger ones. The previous literature examines the relationship between age and the acceptance of a new promotional channel or method (Chiou-Wei & Inman, 2008; Demoulin & Zidda, 2009). Demoulin and Zidda (2009) argue that customers' perceived complexity of a new loyalty card negatively influences their likelihood to adopt the new loyalty card. The OCB program is a PLP, which is a relatively new type of LP. Its members could perceive PLP to be rather complicated because of its extensive alliance network. Therefore, for members to fully utilize this

new and complicated LP, they should have intimate knowledge about its structure and benefits. Younger member customers are generally superior in this regard and can thus comfortably make redemptions. Hypothesis 3: The propensity to redeem points is higher for younger member customers than for older member customers.

2.4. Gender

Gender also plays a crucial role in consumption decision, with women and men showing different behaviors (Bakewell, 2006; Kim & Lee, 2015). Past studies report that women are more deal-prone than men (Kwon & Kwon, 2007; Leeflang, Spring, Doorn, & Wansbeek, 2013). In addition, making household purchases is traditionally considered a responsibility of women, especially in the Confucianism-based society of Korea (Park, Han, & Cho, 1995). Therefore, women tend to develop experience and knowledge for efficient consumption (Collins, 1992; Park, Shin, & Ju, 2014). Kwon and Kwon (2007) also argue that compared with men, women are more socialized to shop and accordingly develop more experiences and knowhow. Regardless of their personal interests or abilities, women tend to develop expertise as good shoppers, and they are highly likely to leverage deal opportunities. Hypothesis 4: The propensity to redeem points is higher for female member customers than for male member customers.

2.5. Interaction effects

As discussed, an online setting of LP provides a direct and convenient context for customers. However, an understanding of the moderating role of the online channel in the relationship between demographic variables and the propensity for point redemption is limited. The explosive expansion of Internet technologies has enabled customers to easily connect to the online channel of a firm from diverse locations (Venkatesh & Agarwal, 2006). Thus, the online channel facilitates an effective infrastructure and user-friendly interface for enhancing customer expertise in shopping (Chiou-Wei & Inman, 2008; Kim, 2015). Zhang and Wedel (2009) report that online customers are more homogeneous in their shopping behavior compared with offline customers. These studies suggest that the online channel creates a homogeneous transaction platform for customers, which in turn mitigates the demographic effect on point redemption. Hence, this study proposes that the effects of the demographic variables of income, age, and gender will be moderated in the online channel environment.

This study suggests the following hypotheses to examine the moderating effects of the online channel and demographic variables. Hypothesis 5: In online transactions, the main effect of each demographic variable (i.e., income, age, and gender) on member customer's propensity to redeem is mitigated. Hypothesis 5a: In online transactions, the positive relationship between member customers' propensity to redeem points and income is mitigated. Hypothesis 5b: In online transactions, the negative relationship between member customers' propensity to redeem points and age is mitigated. Hypothesis 5c: In online transactions, the extent to which female member customers' propensity to redeem points is greater than that of male member customers is mitigated.

2.6. Control variables

To explain the determinants of the point redemption versus accumulation behaviors of member customers, this study considers the following control variables: member customers' marital status, residential area, available points to redeem at the time of a given transaction, and cumulative number of transactions. Previous studies widely analyze household size and its proxies as independent variables in the promotion and LP literature (i.e., Chiou-Wei, 2004). A member customer's marital status can serve as a proxy for the size of the household in this study. However, the informational content related to members' marital status is limited. For instance, if a married couple is separately registered as a member, the data keep track of each individual's shopping behaviors, and no means of grouping the couple's records into the same household are available. This study considers marital status only as a control variable because of such limitation in the dataset (Demoulin & Zidda, 2009; Meyer-Waarden & Benavent, 2006).

A member's residential area also involves limited information. The residential area variable in dataset simply indicates whether a member customer resides in Seoul (the capital city of Korea) or outside of Seoul; thus, its managerial implications for comparisons between metropolitan cities and rural communities are limited. For this reason, this study considers residential area as another control variable in the model.

This study also controls for the amount of points available at the time of a certain transaction because the likelihood of point redemption increases when member customers have more accumulated points during their purchase (Taylor & Neslin, 2005). Finally, this study includes the cumulative number of transactions as a control variable to account for the possibility that a member customer's point usage pattern changes over time. For instance, as member customers gain experience with a specific PLP, they may become well informed of the redemption mechanism of the PLP.

3. Research methods

3.1. Data

Empirical analysis in this study utilizes the data on the OCB program, a major PLP currently run by SK Planet. The program currently has partnerships with roughly 50 large-sized offline affiliates, 50,000 mid-/small-sized offline affiliates, and 150 online affiliate stores. Transactions through online channels have no minimum point restriction for redemption. However, for transactions through offline channels, member customers must have at least 5000 OCB points to redeem points. For each member store, the maximum amount of points to be accumulated per transaction is 100,000, and the accumulated points expire in five years.

Member stores do not pay fixed fees to SK Planet. Instead, a negotiated fraction of the accumulated points is paid to SK Planet as the deal point. Thus, the total amount of fees varies depending on the size of the total accumulated points for the relevant transaction. Using this platform allows member stores to curb the fixed costs that they have to incur to construct and run an independent LP. Affiliate members can also benefit from increased sales through customer acquisition and retention and consequently strengthen the loyalty of a wide range of customers. In addition, the platform facilitates cross-purchases that diffuse customer loyalty throughout the network by providing customers with strong incentives to redeem points within the network.

In December 2010, the authors surveyed 2021 OCB member customers who consented to the use of their demographic profiles and transaction history stored in the SK Planet database. As a reward, the subjects received 500 OCB points or roughly USD 10. The authors employed a stratified sampling approach to obtain a representative sample.

This study eliminates from the sample those who have not used their OCB membership cards for the past six months from the last day of data collection or those whose demographic profiles are incomplete. The final sample consists of 1950 member customers with an average age of 30.7 years. The demographic details of the sample customers are reported in Table 1. Among the respondents, 58.3% are male, 64.8% are single, and 55.5% live in the area of Seoul. As for the monthly income level, majority of the member customers earn less than USD 5000. One limitation of data used in this study is that the sample is skewed towards more male customers than female customers and towards a younger population than national average. By comparison, the overall proportion of male in Korea was 49.35% in 2010. Information was

Table 1
Demographic statistics.

Measure	Value	Freq.	%	Measure	Value	Freq.	%
Gender	Male	1136	58.3	Marital status	Single	1264	64.8
	Female	814	41.7		Married	686	35.2
Age	20–29	957	49.1	Residential area	Capital city	1082	55.5
	30–39	784	40.2		Non-capital city	868	44.5
	40–49	209	10.7	Occupation	Student	455	23.3
Monthly income level	less than $3,000	851	43.6		Housewife	173	8.9
	$3000–$4999	659	33.8		Specialist	242	12.4
	$5000–$6999	287	14.7		Self-employed	143	7.3
	$7000 or more	153	7.9		Full-time worker	881	45.2
					Others	56	2.9

Number of samples = 1950.

collected from the Korean Statistical Information Service. And the average (median) age is 40.3 (40.8) in 2015. As for the income level, the distribution of the monthly income level of sample suggests that sample is on par with the national average, as the average monthly income for an employee was USD 3116 in 2013.

Data also provide the transaction details of these 1950 customers between January 1, 2010 and January 28, 2012. The average membership period of the customers is 3266 days. For each member in the sample, the membership period covers the days between the enrollment date in the OCB membership and the transaction date. The average number of transactions for the members in sample is 215.7. Among these transactions, 36.7 transactions occur through the online channel. Moreover, among the average 215.7 transactions, the member customers accumulate points in 197.6 transactions and redeem points in 18.2 transactions. Table 2 provides the summary statistics of the transaction data.

3.2. Defining variables

The dependent variable in this analysis, Redemption, takes the value of 1 if a member customer redeems his/her points to make the purchase and 0 if he/she does not redeem his points and rather accumulates points for the transaction. From the total number of transactions of sample, this study excludes offline transactions in which the total amount of available points at the time of the transactions is less than 5000. The reason for the exclusion is that a member customer can redeem points through an offline vendor when he/she has accumulated at least 5000 points. By contrast, online transactions have no such point restrictions. The final number of transactions used in this analysis is 420,527.

This study uses several variables to explain the determinants of point redemption versus accumulation. Online is a binary variable that takes the value of 1 when the transaction occurs in an online store. This study also includes the demographic information of the member customers making the transaction. These demographic variables are based on the survey described in the previous section. $\text{Income}_{(j)}$ is a dummy variable with different categories of the monthly income level of the member customers. This variable takes the value of 1 if (1) Income_1 < USD 3000, and 0 if otherwise; (2) USD 3000 ≤ Income_2 < USD 5000, and 0 if otherwise; (3) USD 5000 ≤ Income_3 < USD 7000, and 0 if otherwise; and (4) Income_4 ≥ USD 7000, and 0 if otherwise.[1]

Age is a continuous variable that indicates the member customers' age at the time of their transactions. The Gender variable takes the value of 1 when the member consumer involved in the transaction is a male. Marital Status is a binary variable with the value of 1 when the member customer is married at the time of the transaction. This study also includes a dummy variable, Capital, which takes the value of 1 if the member customer lives in Seoul or its suburban area.

Available points are the points available for redemption at the time of the transaction. The conjecture is that the likelihood of point redemption increases when the member customer has more points at his/her disposal. To account for the right skewness in the distribution of the available points and the transaction order sequence in the sample, this study takes the natural logarithm of these variables. Table 3 reports the summary statistics of each variable.

Table 4 reports the pairwise correlations between the variables used in this analysis. The highest absolute value of correlation is 0.56, which is below the frequently used multicollinearity threshold of 0.6 (Greene, 2003). This study also calculates the variance influence factors (VIFs) to detect multicollinearity among the explanatory variables. The highest VIF is 1.68, which suggests that the multicollinearity problem is not evident in data sample.

Table 2
Descriptive statistics of transaction data.

Measure	Min.	Max	Mean	Std. dev.
Subscription period (day)	33	4410	3266.2	1108.7
Number of transactions	1	1318	215.7	167.3
Number of online transactions	0	434	36.7	45.2
Number of accumulations	1	1230	197.6	156.8
Number of redemptions	0	219	18.2	21.4

Number of samples = 1950; transaction period: 1/1/2010–1/28/2012.

3.3. Empirical models

The main dependent variable captures the decision to redeem or accumulate LP points, both at the transaction level and at the customer level. As for the transaction-level analysis, this study first uses a binary logit model as a means of representing the member customers' decision of whether to redeem or accumulate points at the time of their transactions. The model considers the fixed effect of member customers in order to control the unobserved heterogeneity of the member customers.

$$\begin{aligned}\text{P}(\text{Redemption} = 1) = {} & \beta_0 + \beta_1 \cdot \text{Online} + \beta_2 \cdot \sum \text{Income}^{j} + \beta_3 \cdot \text{Age} \\ & + \beta_4 \cdot \text{Gender} + \beta_5 \cdot \text{Marital} + \beta_6 \cdot \text{Capital} + \beta_7 \\ & \cdot \text{Avail\_Points} + \beta_8 \cdot \text{Tr\_Order} + \beta_9 \\ & \cdot \sum \text{Customer}_i + \varepsilon.\end{aligned}$$

Table 3
Summary statistics of variables.

Variable	Min	Max	Mean	Std. dev.
Redemption	0	1	0.1	0.3
Online	0	1	0.2	0.4
Avail_Points	0	16.4	9.9	1.6
Tr_Order	0.7	8.2	6.3	0.9
Num_Trans	1	1318	215.7	167.3
Num_Redem	0	219	18.2	21.4
Online_Ratio	0	94.7	18.2	16.6
TR_Date	3.5	8.4	8.0	0.5
Income_1	0	1	0.4	0.5
Income_2	0	1	0.4	0.5
Income_3	0	1	0.2	0.4
Income_4	0	1	0.1	0.3
Age	20	49	31.8	6.2
Gender	0	1	0.5	0.6
Marital	0	1	0.4	0.5
Capital	0	1	0.5	0.6

[1] The survey was conducted using income levels denominated in Korean Won. In this paper, approximately 1000 Korean Won = USD 1.

Table 4
Correlation matrix.

	Avail_Points	Tr_Order	Online	Gender	Marital	Age	Capital
Avail_Points	1.00						
Tr_Order	0.48***	1.00					
Online	−0.06***	−0.11***	1.00				
Gender	0.10***	0.08***	−0.01***	1.00			
Marital	0.17***	0.33***	−0.11***	0.02***	1.00		
Age	0.21***	0.41***	−0.11***	0.20***	0.56***	1.00	
Capital	−0.01***	0.01***	0.00**	0.03***	−0.02***	0.04***	1.00

Number of observations = 420,527; maximum value of VIF's = 1.68.
* 0.10
** 0.05.
*** 0.01.

In customer-level analysis, this study employs a grouped logit model that is appropriate for analyzing the data stated in proportions. This study defines the probability that a particular member customer i selects redemption in the transaction as P (Redemption = 1) = e^Z / (1 + e^Z), where Z is a linear equation of the variables that may affect the member customer's decision.

$$P_i = E(\text{Redemption}_i = 1|X) = \frac{1}{1+e^{-(\beta_0+\beta_1 X)}} = \frac{1}{1+e^{-Z}} = \frac{e^Z}{1+e^Z},$$

where $Z = \beta_0 + \beta_1 \cdot \text{Online\_Ratio} + \beta_2 \cdot \sum \text{Income}^j + \beta_3 \cdot \text{Age} + \beta_4 \cdot \text{Gender} + \beta_5 \cdot \text{Marital} + \beta_6 \cdot \text{Capital} + \beta_7 \cdot \text{Tr\_Date}$.

This study expresses the odds ratio as $P_i/(1 - P_i)$, the ratio of the probability that a member customer will choose to redeem points to the probability of accumulating points. This study applies the natural log results in the logit L_i as follows:

$$L_i = \ln\left(\frac{P_i}{1\text{-}P_i}\right) = Z_i = \beta_0 + \beta_1 \cdot \text{Online\_Ratio}_i + \beta_2 \cdot \sum \text{Income}_i^j + \beta_3 \cdot \text{Age}_i + \beta_4 \cdot \text{Gender}_i + \beta_5 \cdot \text{Marital}_i + \beta_6 \cdot \text{Capital}_i + \beta_7 \cdot \text{Tr\_Date}_i + \varepsilon_i.$$

4. Analyses and results

4.1. Determinants of point redemption at the transaction level

Table 5 shows the results of the logit regression which explains the point redemption and accumulation behaviors of the member customers. For every model specification, this study finds that the coefficient of the Online channel variable is positive. Member customers are more likely to redeem LP points through online channels compared to offline channels (i.e., at least $e^{1.5335} = 4.63$ times greater according to Model 1). This result is consistent with Hypothesis 1, in that online channels provide a better and more convenient environment for utilizing point redemption. The coefficients of the Income category dummy variables are all positive. The omitted income category is the lowest level of income; thus, the result suggests that wealthy people are more likely to consume points. This result is consistent with Hypothesis 2. The effect of the Age variable is negative and significant, which implies that younger people are more likely to redeem loyalty points in making purchases. This result is consistent with Hypothesis 3. The effect of the Gender variable is positive but statistically insignificant at conventional levels. Therefore, the result does not support Hypothesis 4, which argues that female member customers are more likely to redeem points than male member customers.

In order to examine the moderating role of an online channel on the relationship between the demographic variables and point redemption behavior, this study interacts each demographic variable with the online channel variable in Models 2 to 4 and include all interaction variables in Model 5. Model 2 shows that the coefficients for the interaction variables with the two highest income categories (Income_3, Income_4) are negative and statistically significant. This result implies that the online environment mitigates the positive effect of the income level on the point redemption tendency; hence supporting Hypothesis 5a.

In Model 3, the coefficient of the interaction term between Online channel and Age is negative but statistically insignificant. The intuition behind Hypothesis 5 is based on the idea that the online channel induces a more homogeneous user environment which in turn mitigates the age effect on point redemption. However, the insignificant coefficient of the interaction variable does not support Hypothesis 5b. The negative coefficient of the Age variable itself does suggest that younger people are more likely to redeem points compared with older people in general. However, there exists no statistical difference in the effect of age with respect to the online versus offline transaction platform, probably because older customers also experience difficulties in using the online platform.

Model 4 shows that the coefficient of the interaction term between Online channel and Gender is negative. This result implies that although no statistical difference between men and women in their point redemption behavior exists as shown by the insignificant coefficient of the Gender variable in Model 1, women show a greater likelihood of redeeming points than men in the online platform. This result does not support Hypothesis 5c, and rather points towards the opposite relationship in that woman member customers are more likely to redeem points through an online platform, compared with men.

Model 5 includes all the interaction variables in one logit regression. The results in Model 5 are consistent with those of previous models, which include one interaction variable at a time. The greater tendency of wealthier people to redeem points is mitigated in online channels, which supports Hypothesis 5a. The coefficient of the interaction variable between online channel dummy and the age variable is statistically insignificant, which does not support Hypothesis 5b. Finally, Model 5 shows that women are more likely to redeem points when they transact in online channels compared to men, which shows contradicting evidence against Hypothesis 5c.

4.2. Determinants of point redemption at the member consumer level

In order to further explore the determinants of point redemption, this study also examines an alternative measure of point redemption behavior. Although the previous analysis has the natural appeal of utilizing all transactions supplied by the data, the results can be heavily influenced by the characteristics of customers who make frequent transactions. Therefore, to augment earlier analysis, this study examines the factors at the member customer level. Given this change in the unit of observation, this study replaces the online transaction dummy variable with the ratio of the number of online transactions to the total number of transactions. This study also omits the measure of available points at the time of the transactions and replaces the transaction order variable with transaction date, which measures the number of days between the first and last transactions of the member customer.

Table 5
Determinants of point redemption: logit regression (with fixed effects).

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Online	1.5335***	1.5703***	1.5736***	1.7110***	1.6513***
	(0.0150)	(0.0235)	(0.0776)	(0.0229)	(0.0783)
$Income_2$	2.1689**	2.1678**	2.1678**	2.1235**	2.1218**
	(1.0787)	(1.0786)	(1.0787)	(1.0786)	(1.0786)
$Income_3$	2.3647*	2.3770*	2.3573*	2.2743*	2.3031*
	(1.2687)	(1.2687)	(1.2686)	(1.2683)	(1.2685)
$Income_4$	3.8466*	3.8392*	3.8381*	3.7829*	3.7945*
	(2.4533)	(2.4523)	(2.4530)	(2.4567)	(2.4565)
Age	−0.1091**	−0.1103**	−0.1088**	−0.1102**	−0.1123**
	(0.0516)	(0.0517)	(0.0516)	(0.0518)	(0.0519)
Gender	0.8458	0.8293	0.8440	0.8796	0.8679
	(1.3197)	(1.3178)	(1.3191)	(1.3265)	(1.3259)
Marital	−1.7190	−1.6918	−1.7152	−1.6377	−1.6155
	(1.5484)	(1.5473)	(1.5479)	(1.5562)	(1.5564)
Capital	−0.4898	−0.4702	−0.4898	−0.3675	−0.3422
	(1.3263)	(1.3272)	(1.3263)	(1.3299)	(1.3310)
Avail_Points	0.3111***	0.3111***	0.3111***	0.3103***	0.3103***
	(0.0079)	(0.0079)	(0.0079)	(0.0079)	(0.0079)
Tr_Order	0.2292***	0.2299***	0.2296***	0.2288***	0.2287***
	(0.0275)	(0.0275)	(0.0275)	(0.0275)	(0.0275)
On_Income_2		−0.0193			−0.0206
		(0.0350)			(0.0348)
On_Income_3		−0.1252***			−0.1341***
		(0.0449)			(0.0451)
On_Income_4		−0.1278**			−0.1293**
		(0.0566)			(0.0563)
On_Age			−0.0013		−0.0034
			(0.0025)		(0.0026)
On_Gender				−0.2983***	−0.3062***
				(0.0302)	(0.0307)
Constant	−4.2097***	−4.1987***	−4.2191***	−4.2944***	−4.2621***
	(1.0013)	(1.0015)	(1.0012)	(1.0011)	(1.0015)
LL	−102,864	−102,678	−102,684	−102,630	−102,622
Pseudo R^2	0.1526	0.1526	0.1526	0.1530	0.1531

Dependent variable: redemption. Number of observation = 416,669. Robust standard error is in parenthesis.
* 0.10.
** 0.05.
*** 0.01.

This variable controls for the degree of experience in using the loyalty program for each customer.

Table 6 shows the results of the grouped logit regression of examining the determinants of point redemption at the member customer level. The results in Table 6 indicate that, consistent with the result in Table 5, member customers are more likely to redeem points for online transactions, which support Hypothesis 1. As for the income level, the results in Table 6 indicate that member customers in the highest category of income ($Income_4$) are more likely to redeem points compared to those in the lowest category of income level. In Table 5, results show that member customers who are in the higher levels of income ($Income_2$, $Income_3$, $Income_4$) all show greater point redemption behavior compared to those in the lowest category of income level. Collectively, these results suggest that wealthy people are more likely to demonstrate greater point redemption behavior and support Hypothesis 2. As for the Age variable, the coefficient is negative. This finding implies that younger customers are more likely to redeem points, which is consistent with the result in Table 5 and Hypothesis 3. The result for the Gender variable does not support Hypothesis 4, which predicts that women are more likely to redeem points compared with men and suggests a negative coefficient of the Gender variable in empirical results. However, the coefficients are positive and insignificant in Models 1 to 3, and positive and significant in Models 4 and 5.

Models 2 to 5 include the interaction terms between the Online Ratio variable and the demographic variables of interest. Model 2 includes interaction variables between the Online Ratio and the Income category variables. The coefficients of the interaction variables are negative for all three higher income level categories and statistically significant for $Income_2$ and $Income_4$. This negative effect of the higher-income categories with respect to the point redemption behavior in online channels is consistent with the results in Table 5 and suggests that the online platform mitigates the effect of member customers' income on their point redemption behavior. This result supports Hypothesis 5a.

Model 3 shows that the coefficient of the interaction variable between the Online Ratio variable and the Age variable is positive. Although younger customers are more likely to show greater point redemption behavior compared with older customers (suggested by the negative coefficient of the Age variable), this effect is mitigated in an online platform (suggested by the positive coefficient of the interaction effect between Online Ratio and Age). The result supports Hypothesis 5b. The relative size of the coefficients implies that for member customers using an online platform for their transactions, younger customers are still more likely to redeem points compared with older customers.

Model 4 shows the results of the interaction effect between Online Ratio and Gender. The coefficient of this interaction variable is negative, which is consistent with the result of Table 5. The different finding in Table 6 is that for some model specifications (Models 4 and 5), results show that the coefficient of the Gender variable is positive. This result suggests that although male customers show a greater tendency to redeem points compared to female customers, this effect is mitigated in an online channel. Therefore, although the effect of the Gender variable itself does not support Hypothesis 4, the results of the model with the interaction variable support Hypothesis 5 that the online channel mitigates the effect of the demographic information of member customers. The overall impact of the Gender variable on the proportion of point-redeeming transactions in an online channel is 0.0586–0.0022 =

Table 6
Determinants of point redemption: grouped logit regression.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Online_Ratio	0.0229***	0.0251***	0.0191***	0.0243***	0.0205***
	(0.0003)	(0.0004)	(0.0016)	(0.0005)	(0.0017)
$Income_2$	−0.0230*	0.0765***	−0.0229*	−0.0230*	0.0890***
	(0.0134)	(0.0203)	(0.0134)	(0.0134)	(0.0205)
$Income_3$	−0.0037	0.0091	−0.0016	−0.0048	0.0170
	(0.0171)	(0.0255)	(0.0171)	(0.0171)	(0.0258)
$Income_4$	0.0998***	0.2914***	0.0995***	0.1005***	0.2989***
	(0.0213)	(0.0314)	(0.0213)	(0.0213)	(0.0314)
Age	−0.0106***	−0.0105***	−0.0134***	−0.0108***	−0.0152***
	(0.0012)	(0.0012)	(0.0016)	(0.0012)	(0.0017)
Gender	0.0082	0.0070	0.0109	0.0586***	0.0653***
	(0.0117)	(0.0118)	(0.0118)	(0.0179)	(0.0180)
Marital	0.1086***	0.1025***	0.1110***	0.1056***	0.1032***
	(0.0144)	(0.0144)	(0.0143)	(0.0144)	(0.0144)
Capital	0.0751***	0.0703***	0.0750***	0.0756***	0.0702***
	(0.0116)	(0.0116)	(0.0116)	(0.0116)	(0.0116)
Tr_Date	0.1195***	0.1251***	0.1195***	0.1171***	0.1228***
	(0.0164)	(0.0165)	(0.0164)	(0.0164)	(0.0165)
On_Income_2		−0.0043***			−0.0048***
		(0.0007)			(0.0007)
On_Income_3		−0.0001			−0.0003
		(0.0009)			(0.0009)
On_Income_4		−0.0082***			−0.0085***
		(0.0010)			(0.0010)
On_Age			0.0001**		0.0002***
			(0.0001)		(0.0001)
On_Gender				−0.0022***	−0.0024***
				(0.0006)	(0.0006)
Constant	−3.5635***	−3.6606***	−3.4790***	−3.5717***	−3.5363***
	(0.1290)	(0. 1303)	(0.1341)	(0.1290)	(0.1348)
LL	−118,699	−118,658	−118,697	−118,693	−118,644
Pseudo R^2	0.0233	0.0236	0.0233	0.0233	0.0237

Dependent variable: ln(Num_Redem / Num_Trans), Number of Observation = 420,672. Robust standard error is in parenthesis.
* 0.10.
** 0.05.
*** 0.01.

0.0564 according to Model 4, and 0.0653–0.0024 = 0.0629 according to Model 5. Therefore, in online channel, female customers are 1.06 ($=e^{0.0564}$ according to Model 4, and $e^{0.0629}$ according to Model 5) times more likely to redeem points on average than male customers.

In summary, this study finds that the overall results are consistent throughout the various measurements of point redemption and various model specifications. Table 7 provides a summary of hypotheses with respect to the variables used in the regression. Member customers demonstrate a greater tendency to redeem points as opposed to accumulating points when they have a greater proportion of online transactions, which supports Hypothesis 1. As for the demographic characteristics of member customers, wealthier customers and younger customers show a greater tendency to redeem points, which support H2 and H3, respectively. This study does not find evidence that supports Hypothesis 4, which predicts that female customers show greater point redemption behavior compared with male customers. Online platforms show moderating impact on the point consumption behavior of customers. Specifically, the online channel mitigates the effects of income (supportive of H5a) and to a certain degree, age (supportive of H5b) as appearing in Table 6. Finally, in an online platform, women are more likely to redeem points compared with men.

5. Conclusion

5.1. Discussion

Customer equity is critical to a firm's long-term success. Loyalty programs are one of the most popular marketing strategies for customer equity management. Therefore, the successful operation of LPs is a key factor for a firm's customer equity management. As numerous

Table 7
Determinants of point redemption: summary.

Variable	Expected sign	Actual sign in the logit regression	Actual sign in the grouped logit regression
Online	+ (Hypothesis 1)	+	+
$Income_2$	+ (Hypothesis 2)	+	+,−
$Income_3$	+ (Hypothesis 2)	+	0
$Income_4$	+ (Hypothesis 2)	+	+
Age	− (Hypothesis 3)	−	−
Gender	− (Hypothesis 4)	0	0 (+ in some models)
Marital	Control variables		
On_Income_2	− (Hypothesis 5a)	0	−
On_Income_3	− (Hypothesis 5a)	−	0
On_Income_4	− (Hypothesis 5a)	−	−
On_Age	+ (Hypothesis 3)	0	+
On_Gender	+ (Hypothesis 4)	−	−

companies adopt LPs to attract new customers and retain existing customers, the findings of this study can help member stores and LP providers to forecast point redemption activities based on the demographic profiles of their member customers for effective LP and customer equity management. Although several previous studies have examined the factors that affect customer behavior towards coupon redemption (in which the alternative to usage of coupon is simply non-usage), the present work examines if such relationships still hold in situations in which the alternative to redemption is saving points. This study performs analyses with a rich set of member customers' transaction data and matching demographic and income information. These unique data enable us to conduct an empirical validation both at the transaction and member customer levels. The most distinctive feature of the dataset used in this analysis is to provide an appropriate setting for examining how two different platforms (online versus offline) affect member customers' point redemption behavior, both directly and indirectly, through its effect on demographic and income variables. Previous studies have yet to investigate this effect in the context of LP environment; thus, this research contributes to the literature by filling this gap.

An important finding of this study is that member customers are more likely to redeem LP points through online channels. As most online channels provide an explicit and clear option to pay with LP points at checkout, this interface can induce member customers to use their LP points when making transactions. Therefore, stores that prefer to change their member customers' point redemption behavior in offline channels can provide an informative interface through which member customers can easily redeem their points. For instance, member stores may educate their sales persons or cashiers to inform member customers about the amount of available LP points that can be used.

This study also finds that unlike their older counterparts, younger member customers are more adept at redeeming points and are more likely to redeem points rather than accumulate them. This finding implies that for an LP heavily populated by younger member customers, the LP provider should be keen on monitoring the aggregate balance of LP points because these points could be redeemed quickly by member customers.

Another managerial implication of the findings of this study lies in member customers' income level. The finding that member customers with high income are active in redeeming membership points suggests that LPs should take differentiated approaches to improve the effectiveness of the program for different income groups. For high-income customers who are already heavy users of LP points, LP providers should offer effective strategies to strengthen customer loyalty on the basis of their active redemption behavior. For low-income members, LP providers may need to exert effort to induce them to redeem program points for the long-term success of the program.

This study also suggests that if a large proportion of transactions occur through online channels, the previously mentioned demographic impacts of member customers are reduced, possibly because the online environment changes the behavior of member customers. An important managerial implication of this finding is that LP providers can strategically alter the exogenous impact of the demographic profiles of their member customers by changing the main channels of their respective LPs.

5.2. Limitations and future research

One limitation of the study is that the survey data are available only at the member customer level and not at the household level. Access to household-level data will be useful because (1) a number of purchases made through the OCB program would be for the use of family members instead of individuals and (2) one can examine the effects of household income on the point redemption behavior of member customers.

Another limitation is that this study is restricted to examining point redemption at the cross-sectional level using the member customer fixed effect. With appropriate time-series survey data on the member customers' demographic and income information, one can enrich this analysis of their decisions regarding point redemption versus accumulation. For instance, one can examine the changes in redemption pattern after member customers get married, when they move into the capital city, and when their income changes.

Future research can also investigate how the different categories of products and services are associated with the point redemption and saving behaviors of member customers. For instance, future studies can examine if point redemption patterns are different between ordinary goods versus luxury goods and between utilitarian goods versus hedonic goods.

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