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Abstract:
We focus on points exchange alliances and their networks as a new loyalty program (LP) design. We examine the nature of such networks and their impact on marketing performance. We find that they are asymmetrical, scale-free networks involving a few hub LPs that form many exchange alliances. Further, on analyzing the relationship between the number of alliances in a network and marketing performance such as membership rate, we find that points exchange programs positively affect marketing performance.

Keywords: Loyalty Program; Loyalty Program Exchange Alliance; Inter-firm Network

Research Highlights:

- We study points exchange alliances and their networks as a new LP design.
- We examine the nature of points exchange networks by applying the indicators relevant to complex networks.
- We find a positive relationship between the number of alliances and marketing performance.

1. Introduction

In recent years, many firms have introduced Loyalty Programs (LPs) to establish relationships with their customers. In 2002, the market value of LPs in the United States is roughly 6 billion dollars, with 1.8 billion member identifications issued (Dorotic, Bijmolt, and Verhoef, 2012). This equates to an average of seven LPs per person. According to Berman (2006), 95% of people in Canada participate in at least one LP. In the United Kingdom, 92% of people participate in at least one LP, and 78% percent participate in more than two. In Japan, the largest three mobile phone service firms that dominate the country's market have all introduced LPs. According to Japan's Ministry of Internal Affairs and Communications (MAC), 95% of people own their own mobile phone (MIAC, 2012). Therefore, the majority of people in Japan are participating in a LP, whether they are aware of it or not.

As shown above, firms worldwide are introducing LPs all. However, some studies challenge the contribution of such programs to market performance. Zhang and Breugelmans (2012) argued that since most firms now utilize LPs, they are no longer effective in contributing to competitive advantage. This argument suggests that LPs cannot retain customer loyalty, which is one of their ultimate goals. Consequently, many firms are attempting to redesign LPs to enhance their effectiveness, and LP points exchange alliances are one such example. In this LP design, Firm A and Firm B share a points exchange alliance. When a customer accrues points with firm A, s/he become eligible to receive a service provided by firm B. Many firms in Japan form points exchange alliances, with some points convertible to electronic money. These exchange alliances form a large complex network. The Nomura Research Institute (2013) reports that the gross amount of LP points issued in Japan 2013 is estimated at over one trillion yen (approximately ten billion US dollars).

To date there is little empirical evidence to support the contribution of points exchange to improved market performance. Taken at face value, exchanging points between firms implies loss of business. We have to explore the relationship between points exchange alliances and marketing performance.

2. LPs: Their purpose, issues, and designs

2.1. Purposes of LPs

Nunes and Drèze (2006) proposed that LPs serve five purposes. The first is to prevent customer turnover, or "churn", as firms look for ways of increasing customer loyalty (Kumar and Reinartz, 2005) and retention rates (Verhoef, 2003). The second purpose is to win the greatest share-of-customer spending. A number of studies have

explored this aspect of LPs (Wirtz, Mattila, and Lwin, 2007; Meyer-Waarden, 2007). The third purpose is to encourage customers to make additional purchases (Taylor and Neslin, 2005). The fourth purpose is to provide firms with potentially valuable information about customer purchasing behavior and preferences. This information database can assist firms to track and forecast customer equity (Blattberg and Deighton, 1996) and design customer relationship management strategies. The fifth purpose is for LPs to have a positive effect on business profit margins.

A number of studies have examined the relationship between LP implementation and performance. Some studies suggest that LPs increase customer switching costs and reduce price competitiveness (Klemperer, 1987; Kim, Shi, and Srinivasan, 2001). Conversely, Lal and Bell (2003) suggest that LPs, especially frequent shopper programs, increase profitability, particularly with lower spending customers. This study proposes that LPs contribute to firms' profitability by increasing their lower spending, rather than higher spending, customers. Other studies support the effect of LPs in short term customer retention (Lewis, 2004; Taylor and Neslin, 2005).

2.2. Recent Issues with LPs

Although a number of studies support the positive impact of LPs on market share, others challenge their effectiveness. For example, Sharp and Sharp (1997) argue that the positive effect of LPs on repeat purchases is not supported by research. Other studies also do not support their effectiveness (Magi, 2003; DeWulf, Odekerken-Schroder, and Iacobucci, 2001). One of the issues these studies identify is that the saturation of LPs in the market has resulted in loss of competitive advantage (Zhang and Breugelmans, 2012).

2.3. New LP Designs and Exchange Alliances

A number of recent studies claim that the design of the LP is critical in achieving firms' marketing goals (Leenheer et al., 2007; Zhang and Breugelmans, 2012; Kumar and Shar, 2004; Kivetz and Simonson, 2002; Roehm, Pullins, and Roehm, 2002; Van Osselaer, Alba, and Manchanda, 2003; Yi and Jeon, 2003).

There have recently been some progressive approaches to LP design. One example is "customized pricing," which differentiates pricing by individual customer (Acquisti and Varian, 2005). Using this approach, firms can implement heterogeneous customer strategies to avoid customer churn and increase loyalty. Another example is "exclusive promotion," where sales promotions are tailored to individual customers (Barone and Roy, 2010). Another more complex LP design, the "Item-Based Loyalty

Program (IBLP)" aims to differentiate product items (Zhang and Breugelmans, 2012).

While these new designs differentiate customers or products to implement marketing strategies, others employ a different approach. LP partnering and points exchange aims to increase the value of LPs by forming alliances with other LPs. For example, O'Brien and Jones (1995) discuss an LP introduced by several partnering firms with successful results. Dorotic et al. (2012) propose that LP partnering and points exchange have significant business marketing potential.

This study focuses on LP exchange, which differs from traditional LP designs in that it exchanges points provided by different firms across a variety of industries. For example, an airline forms an exchange alliance with a retail store. Customers who have accrued mileage points with that particular airline can utilize the points to receive services provided by the partner retail store, including discounts. If there are many exchange alliances and form a network as mentioned by O'Brien and Jones (1995), customers can obtain desired point through several exchanges.

While authors such as O'Brien and Jones (1995) and Dorotic et al. (2012) discuss points exchange alliances as a new LP design, an empirical study is needed to examine the relationship between points exchange alliances and marketing performance. This study aims to provide such empirical results.

3. The Points Exchange Network

3.1. Study Objectives and Definitions

This study examines the properties and performance of the LP points exchange network. We focus on LPs collected by Poitan, a Japanese website, as an objective dataset. Poitan, Inc. is a firm that provides an Internet-based automatic multiple LP points management system. Member customers participate in multiple LPs in order to manage their points on Poitan. Visitors to the Poitan website can also browse exchange alliance information.

Poitan manages most of the major points programs issued in Japan. However, some points are not classified as LP points, for example electronic money. This is despite consumers purchasing electronic money through financial transactions. The purpose of such electronic money services appears to be different to that proposed in Nunes and Drèze (2006). Customers can also exchange LP points for these electronic money services, which further supports the idea that such services do not share the properties of an LP. This study focuses on the entire LP network, so we do not omit these electronic money services in our analysis. We will discriminate them from LPs, during this study if

required and identify when this is the case. The following section will show that almost all objective points programs satisfy LP conditions.

Terms and notations are defined as follows. The exchange alliance (i,j) describes the relationship between points programs that allows customers to exchange LP i's points to LP j's points. In this alliance, LP i is termed the "initial" LP and j as the "terminal" LP. We describe the number of LP i alliances as k_i^{Out} and "out-degree." LP j alliances are described as k_i^{In} and "in-degree." LPs are sometimes also called "firm" or "node" depending on the context in which they are described. Some LPs relate to more than one firm, as some firms introduce more than two LPs or issue more than two points. Conversely, some LPs are jointly introduced by several firms. When discrimination is needed between "firm" and "LP," we use whichever term is most appropriate. Again, In the context of network analysis, we use "node" instead of "LP," and "path" instead of "alliance." However, these terms denote the same objects.

3.2. Data Collection

In this study, we apply two datasets to examine the LP alliance network structure. The first dataset is the network data of alliances, where each element indicates binomial state, whether the alliance is formed or not. The second is the points accumulation data. Since Poitan automatically manages its members' LP points, we can obtain each member's points accumulation status.

In this study, we collect both datasets twice. In the alliance network dataset the data is collected on March 14th, 2011 and June 6th, 2013. The 2011 points accumulation data is obtained from the two observed datasets collected on May 20th, 2011 and October 1st, 2011. The 2013 data is obtained from the two datasets collected on May 17th, 2013 and September 24th, 2013. As customers regularly redeem points and the accumulation data will be changing, we gather data at two spaced time intervals in each selected year and obtain the average volume. Some customers may temporarily have no points immediately after redemption, and we use the average variable in analysis to address this occurrence.

3.3. Objective Industries and Firms

Table 1 gives a summary of information collected in the datasets. Since the accumulation of objective points is automatically updated, the accumulation volume is not a self-report or manual entry. Within the objective LPs, 117 exist in both 2011 and 2013 suggesting that many LPs were providing services prior to 2011. Two exist only in 2011 and 20 exist only in 2013, suggesting that a substantial number of LPs began

providing services within that two year period.

Table 1: Summary of Dataset Statistics

	2011	2013	Growth rate (%)
Objective number of LPs (N)	119	137	115.1%
Network dataset			
# of LPs which have any alliances (N)	100	128	128.0%
# of isolated nodes	19	9	47.4%
Sum of alliances	433	582	134.4%
Density	0.0308	0.0312	101.3%
Accumulation dataset			
# of members	48324	52021	107.7%
Average # of LP participation	3.36	3.67	109.3%

Table 2 shows the summary of objective LPs (firms) classified according to industry. Poitan classifies firms into 16 industries based on similarity of service. Firms within the same industry are essentially in competition with each other. For example, the airline industry's main purpose of the firms is to retain customers and prevent switching. Credit card firms aim to encourage customers to use their card more frequently. Within objective firms, the points industry has a different purpose. Firms within the industry generate revenue as an intermediate agent. The business model of these firms is based on attracting as many members as possible to generate a high level of advertising revenue. If large numbers of members decide to exchange their points for other points or electronic money services, they can exchange these at a bulk volume discount. The attractiveness of the firm (points program) corresponds to the number of exchange alliances, particularly the number of terminal nodes.

The purpose of firms in the electronic money industry is different from traditional LPs, and are not classed as "narrowly-defined" LPs.

Table 2: Industries and the number of LPs (firms)

No.	Industry	2011	2013
1	Airline	9	11
2	Credit Card	18	22
3	Points	31	35
4	Home Electronics Retailer	4	4
5	Internet Commerce	9	10
6	Book, CD, DVD	2	2
7	Telephone, Internet Provider	6	7
8	Railway	4	6
9	Car Dealer, Gas Station Chain	3	4
10	Supermarket, Department Store, CVS	7	7
11	Bank and Securities	4	4
12	Electronic Money	6	5
13	Hotel	7	7
14	Travel	1	4
15	Inter-firm	2	2
16	Other	6	7
	Total	119	137

In the following section, we examine the properties of the two datasets in more detail, by analyzing the datasets from two aspects. The first analysis examines the properties of the LP exchange network mainly from the network dataset. The results are outlined in the fourth section. The second analysis uses quantitative analysis to examine the relationship between positions of LPs within the network and their marketing performance. The results are outlined in the fifth section.

4. Structure of the LP Exchange Network

4.1. Overview of the Analysis

In this section, we summarize the indicators of the exchange network in order to better understand the structure of the LP exchange market. As there are two datasets (2011 and 2013), we compare the two and observe any changes.

Iacobucci (1996) examines the issues related to marketing networks. In this study, both inter-firm and inter-personal networks are discussed. With inter-personal networks, some studies examine the consumer interaction (Manski, 2000; Yang and Allenby, 2003). Inter-firm network issues are mainly discussed in the field of

organizational studies (Gulati, 1998; Gulati and Gargiulo, 1999; Kenis and Oerlemans, 2008). LP studies seldom consider network effects; therefore in this study we initially explore the network properties of the objective datasets.

4.2. Network Properties

First, we calculate the in-degree and out-degree. To summarize the network, Albert and Barabási (2002) propose several indicators, some of which are applied in this study. In analysis, as we omit the isolated node (LP) the number of objective LPs is 100 in 2010 and 128 in 2013.

Figure 1 shows the distribution of the in(out)-degree for each year. The upper three figures are drawn from the 2011 dataset. The left figure is in-degree, the center figure is out-degree, and the right figure is the scatterplot of in and out-degree. The bottom three figures are the same configuration from the 2013 dataset.

In Figure 1, we can see that a small number of LPs have multiple alliances and the majority of LPs have only a few. This suggests that the networks have scale-free properties (Watts and Strogatz, 1998). We further examine the network indicators that are proposed by Barabasi and Albert (2002). Table 2 shows the calculated indicators.

From the values proposed in Table 3, we find that the LP exchange networks are scale-free. From the log-log transformed plot of Figure 1 (see Appendix) we find linear decreasing relationships. This supports the suggestion that the networks are scale-free.

Additionally, from the right hand side figures in Figure1, the obtained correlation coefficients are 0.018 in 2011 and −0.001 in 2013. This suggests that the LP exchange networks are asymmetrical.

Figure 1: Distributions of In-degree and Out-degree

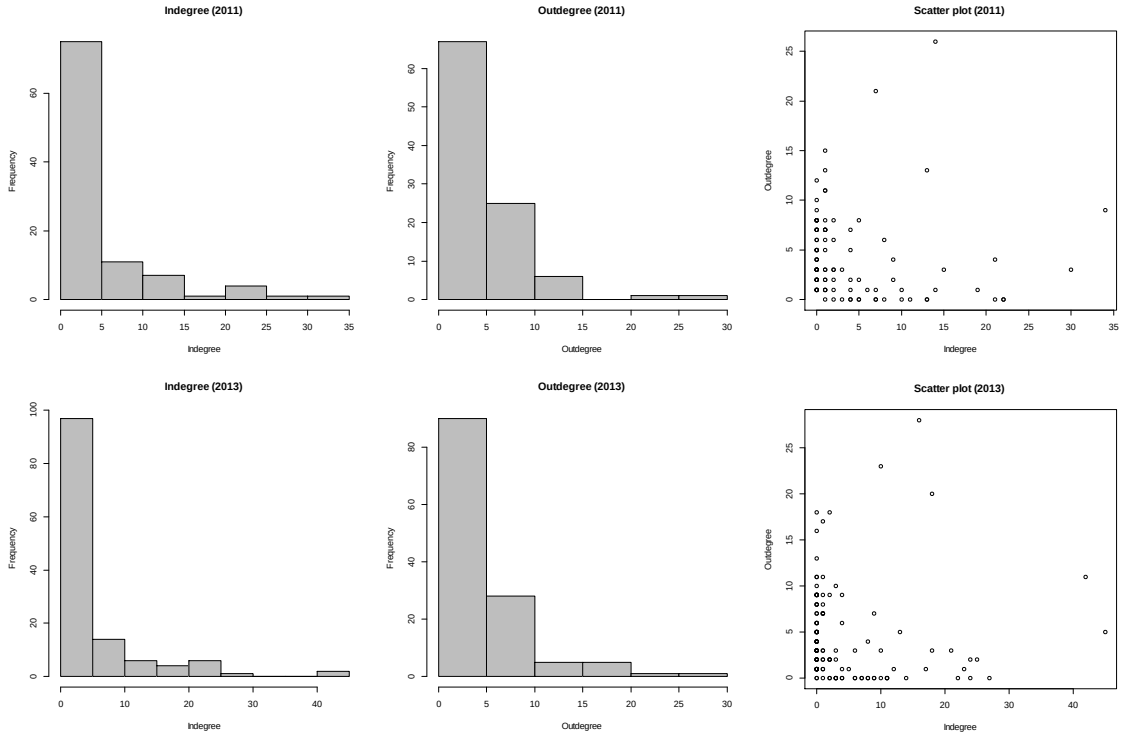


Table 3: Network Indicators

	2011	2013
Number of Nodes	100	128
Average number of Paths	4.33	3.44
Degree Distribution Parameters (Out-degree)	−2.00	−1.99
Degree Distribution Parameters (In-degree)	−1.78	−1.49
Average Path Length	3.21	3.42

Note: Average path length becomes infinity when the two nodes are disconnected. This table averages only connected relations.

4.3. Concentration Rate

In this section, we compare the concentration rates between 2011 and 2013 datasets. We make our calculations from the accumulation dataset, then summarize the total number of accounts (members) for all LPs and obtain the Herfindahl-Hirschman and CRn indices (CR3, CR5, CR10, CR20). Table 3 shows the results. We find that the concentration rates are slightly decreasing. As we show in Table 1, the density of the LP

exchange network is increasing. It is possible that customers will gravitate to a particular LP. In fact, as Dorotic et al. (2012) observes, some LPs are introduced by a joint venture partnership established by several firms. Moreover, some observers predict an increase in concentration (Weekly Toyo Keiaizi, 2013). Interestingly, this result suggests that the concentration rate is actually decreasing. This supports the theory that although larger LPs are actively recruiting members, the network expands when new LPs are introduced to the market..

Table 4: Competition Indicators

		2011	2013
Herfindahl-Hirschman Index		302.65	289.48
Concentration Rate	CR3	20.55	20.20
	CR5	29.46	28.80
	CR10	46.07	44.98
	CR20	65.46	64.16

4.4. Summary

There are two main findings. First, the LP exchange network has been shown to have scale-free properties. In the wider business environment there are many scale-free networks (Barabási and Albert 2002) and the LP exchange network can be included as one of these networks. We can apply findings that are proposed in social networks or complex network studies to LP exchange network studies. The second finding is that the LP exchange network is growing., Despite a number of recent integrations and reorganizations of LPs, the LP exchange network has increased during 2011 to 2013. Further, we find that the average number of consumer participation in LPs is increasing and concentration rates are decreasing. This suggests that the introduction of new LPs is more active than existing LP integration.

5. Exchange Alliances and Marketing Performance

5.1. Overview and Hypotheses

In this section, we examine the relationship between the network position of LPs and their marketing performance to evaluate the LP exchange strategy as a new LP design. We propose three hypotheses and test them using empirical analysis.

The first hypothesis is related to customer acquisition. In an exchange alliance, there are two LPs: initial and terminal. When a customer who has accrued points with

the initial LP and wants to receive services provided by the terminal LP, s/he exchanges points between the initial and terminal LP. This suggests that if an LP has many existing LPs, it has the potential to acquire new customers from these alliances. Therefore, we propose the following hypothesis:

H1: An LP that has more initial LPs achieves higher marketing performance.

The second and third hypotheses are conversely related. The exchange alliance in the role of terminal node is potentially exposed to both benefits and disadvantages. Although exchangeability carries a risk of customer attrition, it increases the attractiveness of the LP. Customers can receive a variety of services from LPs that have more terminal LPs. Therefore, we propose the following two hypotheses:

H2a: An LP that has more terminal LPs achieves higher marketing performance.
H2b: An LP that has more terminal LPs settles for lower marketing performance.

In this study, H2a is based on increased program attractiveness and H2b is based on customer attrition. To examine these relationships further, ideally we need to conduct a customer satisfaction survey. However, as we cannot obtain such data for the purposes of this study, we examine the statistical relationship between network positions and performance indicators.

5.2. Performance Indicators and Model

As a number of previous studies have shown, LP performance is multidimensional. Consequently, we define three performance indicators and apply independent variables using quantitative analysis.

The first performance indicator is the "membership rate." This is an important intermediate indicator in assessing the profitability of LPs. Customer acquisition is the first step of LP management and fulfills other purposes such as increasing switching costs (Verhoef, 2003; Klemperer, 1987; Carlsson and Löfgren, 2006), raising consumption levels (Leenher et al., 2007), and acquiring customer data (Kumar and Shah, 2004). Membership rate is an important indicator, not only for firms that have one main service such as airlines and department stores, but also points and electronic money firms. These firms need to achieve economies of scale in order to reap the benefits of LPs and ensure their business remains profitable. In this study, the membership rate is obtained from the accumulation dataset. For both datasets collected

in 2011 and 2013, the membership rate of LP j is calculated from the number of members of LP j divided into the total Poitan members (objective customers).

The second performance indicator is the total amount of LPs issued, which is the sum of accumulated volume issued for each customer at a time. An LP that has a higher total issued amount is accepted and utilized by many customers. However, the average accumulated volume may vary depending on the industry. For example, airline points (mileage) are not redeemed by customers as often as CVS points. We introduce the industry dummy variable to control these analysis variations. In addition, as the value of one point differs among LPs, we convert each point into Japanese yen using the conversion rate of each LP provided by Poitan.

The third performance indicator is the average accumulated points volume of each customer. Membership rate and total issued amount may be correlated, so we introduce the performance indicator variable from another aspect. We calculate the average accumulated volume of LP j from the total amount issued, divided into the number of members of the LP j. As with the total issued amount, we control the industry variance by introducing dummy variables. This variable is also converted to Japanese yen for consistency of value across all LPs.

We apply these three performance indicators as dependent variables and incorporate in-degree, out-degree, and industry dummy variables as independent variables. The variable range of the membership rate is (0,1), so we convert the variable using normal inverse transformation. As a result, the variable range becomes $(-\infty, \infty)$. For the total issued amount and the average accumulated volume, we take the natural logarithm. We also examine whether the coefficients change between 2011 and 2013. We estimate two models. The first model is a "static model" that assumes the parameters have not changed within the two periods. The second model is a "dynamic model" that assumes the parameters have changed.

5.3. Results

Table 4 shows the estimation results. For each cell, the numbers outside the brackets are estimated values, with standard deviations bracketed. Looking at the table from left to right, the columns show the parameters of membership rate, total issued amount, and accumulated volume of individual customers.

First, we determine the overall usability of the models. For all three performance indicators, the "static models" that assume common parameters in both 2011 and 2013 achieve higher Adj. R2 and lower AIC compared with the "dynamic models." As R2 increases as the number of parameters increase, we cannot use this

indicator for model comparison. Conversely, Adj. R2 and AIC do not have such properties, making these indicators suitable for comparison. The results of this comparison suggest that the "static models" yield more positive results than the "dynamic model" for all three performance indicators. It would appear that the overall tendencies have not changed during the two periods. In addition, the correlation coefficients of the "dynamic models" parameters between 2011 and 2013 are very high for all three indicators (membership rate = 0.973; total issued amount = 0972; accumulated volume = 0.992). We also find from this result that the tendencies have not changed.

From the in-degree and out-degree parameters, we find that there are positive significant relationships between membership rate and total issued amount. However, we cannot find positive relationships between in(out)-degree and accumulated volume.

In the previous section, we proposed three hypotheses, and we now examine these.

H1 proposed that there are positive relationships between in-degree and performance. The results support H1 with regard to membership rate and total issued amount. LPs that have many terminal LPs can attract more members and issue more points. However, we cannot find any positive relationships with the average accumulated volume of customers. As this indicator varies depending on the service, the result is reasonable. It is unlikely that the increasing number of terminal LPs positively affects the accumulated volume.

We find positive relationships between out-degree, membership rate, and total issued amount. We proposed two contradicting hypotheses for out-degree. H2a predicted positive relationships, while H2b predicted negative relationships. The results support H2a. Although we cannot find positive relationships between out-degree and the average accumulated volume of customers, these results do not necessarily support H2b. Therefore, we find that the number of out-degree positively affect membership rate and total issued amount. Further, there are no noticeable negative impacts on performance indicators. This suggests that customer attrition risk is far lower than expected.

In the "dynamic model," when comparing parameters for 2011 and 2013, the estimated values tend to be higher. Although not a significant result, the impact of LP exchange relationships may have increased between these periods.

From the results of this empirical analysis, we can conclude that the number of in-degree and out-degree positively affects marketing performance. In particular, we find a significantly positive relationship to membership rate, which is one of the most important performance indicators. This suggests that utilizing LP exchange alliances can result in positive outcomes for partner firms.

Table 5: Estimation Results

	Membership rate			Total issued amount			Accumulated volume		
	Static	Dynamic		Static	Dynamic		Static	Dynamic	
		2011	2013		2011	2013		2011	2013
(Intercept)	**−3.021 (0.142)**	**−2.989 (0.213)**		**11.876 (0.553)**	**11.84 (0.839)**		**6.956 (0.295)**	6.838 (0.445)	
In-degree	**0.047 (0.005)**	**0.055 (0.009)**	**0.044 (0.007)**	**0.135 (0.021)**	**0.163 (0.037)**	**0.120 (0.028)**	0.022 (0.011)	0.032 (0.02)	0.016 (0.015)
Out-degree	**0.048 (0.008)**	**0.051 (0.013)**	**0.046 (0.011)**	**0.148 (0.032)**	**0.159 (0.053)**	**0.137 (0.042)**	0.018 (0.017)	0.020 (0.028)	0.013 (0.023)
Airline	−0.166 (0.189)	−0.172 (0.288)	−0.182 (0.264)	**2.495 (0.739)**	**2.385 (1.130)**	**2.509 (1.037)**	**3.055 (0.393)**	**2.970 (0.600)**	**3.100 (0.551)**
Card	**0.350 (0.168)**	0.417 (0.257)	0.296 (0.232)	1.191 (0.654)	1.367 (1.010)	1.060 (0.912)	0.215 (0.349)	0.156 (0.537)	0.275 (0.485)
Points	**0.486 (0.154)**	0.449 (0.234)	**0.516 (0.216)**	**2.136 (0.603)**	**1.96 (0.919)**	**2.291 (0.847)**	**0.816 (0.321)**	0.736 (0.488)	**0.896 (0.450)**
Home Electronics Retailer	**0.883 (0.228)**	**0.811 (0.337)**	**0.931 (0.326)**	**4.147 (0.890)**	**4.046 (1.323)**	**4.180 (1.281)**	**1.668 (0.474)**	**1.735 (0.703)**	**1.590 (0.680)**
Internet Commerce	0.252 (0.185)	0.201 (0.279)	0.274 (0.260)	0.049 (0.723)	−0.092 (1.096)	0.089 (1.022)	−0.53 (0.385)	−0.537 (0.582)	−0.548 (0.543)
Book, CD, DVD	−0.277 (0.289)	−0.509 (0.422)	−0.065 (0.416)	−1.351 (1.127)	−2.089 (1.659)	−0.683 (1.634)	−0.456 (0.600)	−0.515 (0.881)	−0.415 (0.868)
Telephone, Internet Provider	**0.541 (0.200)**	0.557 (0.302)	0.513 (0.279)	**2.414 (0.779)**	**2.565 (1.188)**	**2.236 (1.095)**	**0.848 (0.415)**	0.933 (0.631)	0.763 (0.582)
Railway	**0.466 (0.212)**	0.493 (0.335)	0.447 (0.289)	0.733 (0.830)	0.658 (1.315)	0.752 (1.134)	−0.647 (0.442)	−0.813 (0.699)	−0.566 (0.602)
Car Dealer, Gas Station Chain	0.362 (0.236)	0.340 (0.366)	0.382 (0.325)	0.731 (0.923)	0.551 (1.437)	0.851 (1.275)	−0.407 (0.492)	−0.556 (0.763)	−0.317 (0.677)
Supermarket, Department Store, CVS	**0.562 (0.194)**	0.548 (0.288)	**0.576 (0.277)**	1.121 (0.758)	1.113 (1.130)	1.148 (1.087)	−0.565 (0.404)	−0.528 (0.600)	−0.580 (0.578)
Bank and Securities	0.098 (0.227)	0.061 (0.334)	0.134 (0.325)	0.026 (0.886)	−0.106 (1.313)	0.180 (1.277)	−0.298 (0.472)	−0.312 (0.698)	−0.262 (0.678)
Electronic Money	−0.216 (0.213)	−0.265 (0.307)	−0.201 (0.313)	0.373 (0.831)	0.219 (1.207)	0.444 (1.230)	**0.892 (0.442)**	0.868 (0.641)	0.919 (0.654)
Hotel	−0.334 (0.196)	−0.393 (0.289)	−0.278 (0.282)	**1.831 (0.767)**	1.547 (1.137)	2.141 (1.107)	**2.825 (0.408)**	**2.758 (0.604)**	**2.923 (0.588)**
Travel	**−0.537 (0.265)**	−0.582 (0.559)	−0.488 (0.324)	−1.424 (1.036)	−2.001 (2.197)	−1.241 (1.274)	0.357 (0.552)	0.056 (1.167)	0.376 (0.677)
Inter-firm	**1.536 (0.291)**	**1.458 (0.426)**	**1.589 (0.418)**	**3.799 (1.134)**	**3.553 (1.673)**	**3.974 (1.643)**	0.170 (0.604)	0.083 (0.889)	0.249 (0.873)
2013 dummy			−0.065 (0.292)			0.069 (1.146)			0.231 (0.609)
F	16.91	7.965		11.8	5.471		16.97	7.899	
R^2	0.547	0.559		0.457	0.465		0.548	0.557	
Adj R^2	0.515	0.489		0.419	0.38		0.516	0.486	
AIC	564.88	599.3		1425.39	1447.79		765.62	796.48	

Note: Numbers in bold indicate significance at 5%; standard deviations are shown in brackets.

6. Discussion and Conclusion

6.1. Discussion

The results of this statistical analysis suggest that the number of alliances positively affect firms' marketing performance. However, the formulation of an alliance requires the agreement and cooperation of both the initial and terminal firms. Therefore, it is possible that LPs achieving higher membership rates and points issued will form alliances more easily than LPs that have fewer members, as a node that connects to multiple paths can more easily connect with others. Barabási and Albert (1999) proposed that networks generated by "rich get richer" mechanisms are more likely to become a scale-free network. Such mechanisms may affect the LP exchange network. The hypothesis is that an LP that has multiple alliances can attract many customers and positively affect the formation of partner alliances. This study only examines the effect of the number of alliances on performance. However, we need to employ more dynamic and recursive models to examine the process more closely.

This study suggests a positive relationship between out-degree and performance, with the negative effect being significantly lower than previously proposed.

6.2. Conclusion

In this study, we focus on the LP exchange alliance as a new LP design. We examine the properties of the LP points exchange network and the relationship between alliances and marketing performance. We find that the LP points exchange network possesses scale-free properties, and that a small number of hub LPs that form multiple alliances. We also find that the network is asymmetrical. The statistical analysis examines the impact of the number of alliances on marketing performance and finds that both for in-degree and out-degree, the number of alliances positively affect marketing performance, particularly membership rate and the total points issued. This suggests that the LP exchange alliance is one of the most effective designs in obtaining LP benefits.

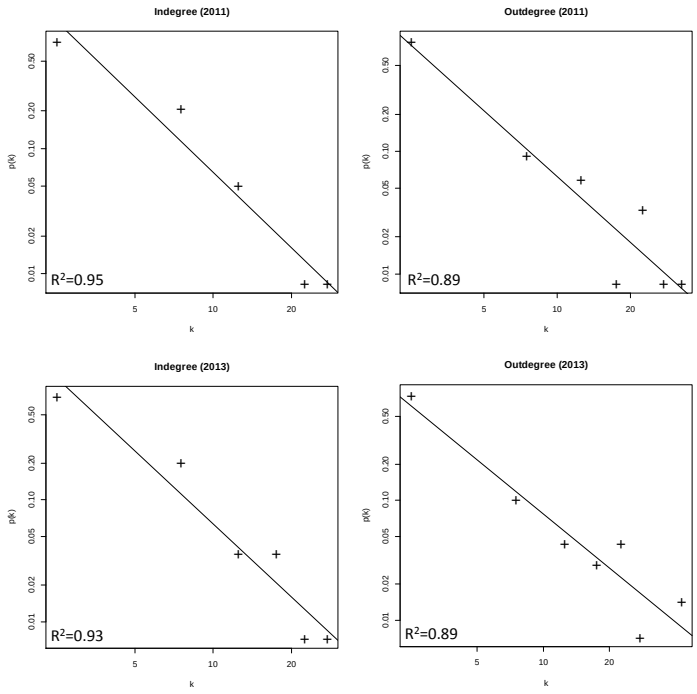
We identify two issues for future exploration. First, we recommend further investigation into the impact of exchange alliances on market performance. This study suggests a positive relationship between the number of alliances and marketing performance; however, more research is needed to explore this connection in more detail. For example, we need to examine whether the number of alliances (or other factors) affects the attractiveness of the LP. As such information cannot be gained using behavioral data, we recommend conducting a customer survey. Further, we need to

observe the volume of exchange within an LP alliance in order to measure its performance more accurately.

The second task is to examine the difference between exchange alliances and the partnering of LPs. As mentioned in this paper, some LPs are introduced through a combined joint venture of large firms. This is an example of partnering LPs. Customers can use and redeem points from both firms within the LP partnership. Partnering involves a closer working relationship than exchange alliances as the partnering firms share the same alliances. We recommend that further research be undertaken to observe whether LP partnering will more often be substituted for exchange alliances in the future.

Appendix

Figure A: Log-log transformed plot of Figure 1 histograms



References

Albert, R., & Barabási, A.L. (2002). Statistical Mechanics of Complex Networks, *Review of Modern Physics*, 74, 47-97.

Acquisti, A., & Varian, H. (2005). Conditioning Prices on Purchase History, *Marketing Science*, 24, 367-381.

Barabási, A.L., & Albert, R. (1999). Emergence of Scaling in Random Networks, *Science*, 286, 509-512.

Barone, M.J., & Roy, T. (2010). Does Exclusivity Always Pay Off? Exclusive Price Promotions and Consumer Response, *Journal of Marketing,* 74, 121-132.

Berman, B. (2006). Developing an Effective Loyalty Program, *California Management Review*, 49, 123-148.

Blattberg, R.C., & Deighton, J. (1996). Manage Marketing by the Customer Equity Test, *Harvard Business Review*, 74, 136-144.

Blattberg, R.C., Kim, B.D., & Neslin, S. (2008). *Database Marketing: Analyzing and Managing Customers*, New York, NY: Springer.

DeWulf, K., Odekerken-Schröder, G., & Iacobucci, D. (2001). Investments in Consumer Relationships: A Cross-country and Cross-industry Exploration, *Journal of Marketing*, 65, 33-50.

Dorotic, M., Bijmolt, T.H.A., & Verhoef, P.C. (2012). Loyalty Programmes: Current Knowledge and Research Directions, *International Journal of Management Reviews*, 14, 217-237.

Gulati, R. (1998). Alliances and Networks, *Strategic Management Journal*, 20, 397-420.

Gulati, R., & Gargiulo, M. (1999). Where Do Interorganizational Networks Come From? *American Journal of Sociology*, 104, 1439-1493.

Kenis, P., & Oerlemans, L. (2008). The Social Network Perspective: Understanding the Structure of Cooperation, in *The Oxford Handbook of Inter-Organizational Relations, 11,289-312*, New York, NY: Oxford University Press.

Kim, B.D., Shi, M., & Srinivasan, K. (2001). Reward Programs and Tacit Collusion, *Marketing Science*, 20, 99-120.

Kivetz, R., & Simonson, I. (2002). Earning the Right to Indulge: Effort as a Determinant of Customer Preferences Toward Frequency Program Rewards, *Journal of Marketing Research*, 39, 155-170.

Klemperer, P. (1987). Markets with Consumer Switching Costs, *Quarterly Journal of Economics*, 102, 375-394.

Kumar, V., & Reinartz, W. (2006). *Customer Relationship Management: A Database Approach*, New York, NY: Wiley.

Kumar, V., & Shah, D. (2004). Building and Sustaining Profitable Customer Loyalty for the 21st Century, *Journal of Retailing*, 80, 317–329.

Lal, R., & Bell, D.E. (2003). The Impact of Frequent Shopper Programs in Grocery Retailing. *Quantitative Marketing and Economics*, 1, 179-202.

Leenheer, J., van Heerde, H.J., Bijmolt, T.H.A., & Smidts, A. (2007). Do Loyalty Programs Really Enhance Behavioral Loyalty? An Empirical Analysis Accounting for Self-selecting Members, *International Journal of Research in Marketing*, 24,

31-47.

Lewis, M. (2004). The Influence of Loyalty Programs and Short-term Promotions on Customer Retention, *Journal of Marketing Research*, 41, 281–292.

Magi, A.W. (2003). Share of Wallet in Retailing: The Effects of Customer Satisfaction, Loyalty Cards and Shopper Characteristics, *Journal of Retailing*, 79, 97-106.

Manski, C.F. (2000). Economic Analysis of Social Interactions, *Journal of Economic Perspectives*, 14, 115-136.

Meyer-Waarden, L. (2007). The Effects of Loyalty Programs on Customer Lifetime Duration and Share of Wallet, *Journal of Retailing*, 83, 223-236

Ministry of Internal Affairs and Communications (2013). *White Paper on Information and Communications in Japan*, Retrieved from http://www.soumu.go.jp/johotsusintokei/whitepaper/eng/WP2013/2013-index.html.

Nomura Research Institute (2013). The Minimum Issued Amount Will Go Beyond 1 Trillion Yen in FY2013 [Press Release; In Japanese] Retrieved from http://www.nri.com/jp/news/2013/130510_2.html.

Nunes, J.C., & Drèze, X. (2006). Your Loyalty Program is Betraying You, *Harvard Business Review*, 84, 124-131.

O'Brien, L., & Jones, C. (1995). Do Rewards Really Create Loyalty? *Harvard Business Review*, 73, 75–82.

Roehm, M.L., Pullins, E.B., & Roehm Jr, H.A. (2002). Designing Loyalty-Building Programs for Packaged Goods Brands, *Journal of Marketing Research*, 39, 202-213.

Sharp, B., & Sharp, A. (1997). Loyalty Programs and Their Impact on Repeat-Purchase Loyalty Patterns, *International Journal of Research in Marketing*, 14, 473-486.

Taylor, G.A., & Neslin, S.A. (2003). The Current and Future Sales Impact of a Retail Frequency Reward Program, *Journal of Retailing*, 81, 293-305.

van Osselaer, S.M.J., Alba, J.W., & Manchanda, P. (2004). Irrelevant Information and Mediated Intertemporal Choice, *Journal of Consumer Psychology*, 14, 257-270.

Verhoef, P.C. (2003). Understanding the Effect of Customer Relationship Management Efforts on Customer Retention and Customer Share Development, *Journal of Marketing*, 67, 30–45.

Wirtz, J., Mattila, A.S., & Lwin, M.O. (2007). How Effective are Loyalty Reward Programs in Driving Share of Wallet? *Journal of Service Research*, 9, 327-334.

Yang, S., & Allenby, G.M. (2003). Modeling Interdependent Consumer Preferences, *Journal of Marketing Research*, 40, 282-294.

Yi, Y., & Jeon, H. (2003). Effects of LPs on Value Perception, Program Loyalty, and Brand Loyalty, *Journal of the Academy of Marketing Science*, 31, 229-240.

Watts, D.J., & Strogatz S.H. (1998). Collective Dynamics of 'Small World' Networks, *Nature*, 393, 440-442.

Zhang, J., & Breugelmans, E. (2012). The Impact of an Item-Based Loyalty Program on Consumer Purchase Behavior, *Journal of Marketing Research*, 49, 50 –65.