Who Imitates Whom?
An Empirical Study on New Product Introductions in the Japanese Soft-drink Industry

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ABSTRACT

Imitation is observed in various contexts in the business world and numerous theories on imitation have been proposed. Incumbent theories on imitation are organized into two broad categories: information-based theories and rivalry-based theories. Information-based theories propose that firms follow others that are perceived as having superior information. Rivalry-based theories propose that firms imitate others to maintain competitive parity or limit rivalry. This study tries to distinguish among the theories by examining when and what kinds of firms are more likely to be followed by others in their new product introductions in the Japanese soft-drink industry. The empirical analysis shows that in brand-new product imitation, firms follow large competitors, while in product proliferation within established product categories, firms do not tend to follow large firms but mimic others of similar size. These contrasting results are reasonable, suggesting that two theories on imitation coexist and environmental uncertainty may be one of key distinguishing characteristics. In the case of brand-new products, firms face much uncertainty. To deal with this uncertainty, firms tend to follow the most informative firms and information-based motives for imitation are dominant. In the case of product proliferation within an established product category, however, a firm is certain that the category exists. Rather, the firm might be afraid that new product introductions by rivals of similar size could damage the firm's position within the category. In such an environment where uncertainty is comparatively moderate, rivalry-based motives for imitation are dominant.

Keywords:
imitation; information cascade; competitive interaction

INTRODUCTION

Imitation is a ubiquitous phenomenon in the business world. Firms imitate each other in the introduction of new products and processes, in the timing of investment, in the entry to new businesses or foreign markets, and in the adoption of managerial methods and organizational forms. Imitation is not only ubiquitous but also has various mechanisms and implications. Firms may imitate a rival's action to avoid falling behind or because the action looks attractive to take for themselves. The matching of rival's action can intensify competition, or it can have the opposite effect, promoting collusion. By reinforcing the diffusion of an early action, imitation can spur productive innovation, or it can amplify the error of the first mover. Thus, imitation can lead to large positive or negative outcomes for individual firms and society as a whole. Given the ubiquity of imitative behavior and the fact that societal outcomes are often negative, it is important to improve our understanding of why imitation occurs.

Numerous theories on the mechanisms of imitation have been proposed. However, the large body of research on imitation remains fragmented, as the theories are based on different academic disciplines and tend to focus on imitative behavior in different contexts. For example, economic theories of herd behavior argue that firms imitate others to economize the costs of collecting information to reduce environmental uncertainty (Banerjee, 1992; Bikhchandani, Hirshleifer, & Welch, 1992; 1998; Scharfstein & Stein, 1990; Palley, 1995). Sociological theories of mimetic isomorphism propose that organizations model themselves on other (successful) organizations to get legitimacy in an uncertain environment (DiMaggio & Powell, 1983). The researchers of international business, competitive dynamics, and multimarket contact suggest that firms follow others to maintain competitive parity or limit rivalry (Knickerbocker, 1973; Smith, Grimm, Gannon, & Chen., 1991; Chen & MacMillan, 1991; Chen, 1996; Karnani & Wenerfelt,

1985; Bernheim & Whinston, 1990; Gimeno & Woo, 1996).

To our best knowledge, Lieberman & Asaba (2006) is the first attempt to help develop this body of theory by drawing together common threads. According to their review, incumbent theories on imitation are organized into two broad categories: information-based theories and rivalry-based theories. Information-based theories propose that firms follow others that are perceived as having superior information. Rivalry-based theories propose that firms imitate others to maintain competitive parity or limit rivalry. Moreover, they propose some predictions about the conditions under which each type of imitation is most likely. Thus, following their discussion, the purpose of this paper is to set out several hypotheses and test them empirically to distinguish among theories on imitation.

This study tries to distinguish among the theories by examining when and what kinds of firms are more likely to be followed by others in their new product introductions in the Japanese soft-drink industry. In the Japanese soft-drink industry, new product introduction is an important form of competitive behavior in the sense that it occurs frequently and successful new products are quickly imitated by competitors. Moreover, the diversity in size of the Japanese soft-drink manufacturers helps us distinguish among the theories. Rivalry-based theories predict that firms tend to mimic competitors of similar size that are perceived as direct rivals, while information-based theories predict that they tend to follow large manufacturers that are perceived as having superior information.

The structure of this paper is as follows. In the next section, we briefly review the theories on imitation and propose several hypotheses distinguishing the different theories. Next, we describe the characteristics of the Japanese soft-drink industry, the data, and methods. The results are reported in section four. Finally, we interpret the results and draw conclusions.

THEORIES AND HYPOTHESES

As mentioned in the introduction, the theoretical explanations of imitation fall into two broad categories: information-based theories and rivalry-based theories. We first consider theories relating to information asymmetry, followed by those relating to competitive processes. After discussing the theories, we introduce several testable hypotheses.

Information-based Theories

Information-based theories of imitative behavior have been proposed in the fields of economics, institutional sociology and population ecology. These theories apply in highly uncertain environments, where managers try to collect information and reduce environmental uncertainty to make a decision. While managers can collect information through experiential learning within their own firm, they can also learn by drawing inferences from the behavior of others. Such vicarious learning is an alternative way to collect information.

The most prominent economic theory of herd behavior is called information cascades or social learning (Banerjee, 1992; Bikhchandani *et al.*, 1992, 1998). Information cascades occur "when it is optimal for an individual, having observed the actions of those ahead of him, to follow the behavior of the preceding individual without regard to his own information" (Bikhchandani *et al.*, 1992). The model formalizes a process of Bayesian learning. Suppose each agent has some private information about the state of nature. The first agent behaves purely based on this private information, but the agent's behavior reveals the information to followers. As this revealed information accumulates, it may be rational for followers to ignore their own prior information and mimic the decisions of others.

In driving such a bandwagon, the actions of some individuals or firms may be weighted

more strongly than others. If some are perceived as likely to have superior information, they can become "fashion leaders" (Bikhchandani *et al.*, 1998). For example, larger firms can spend much money on market research and technology development or can acquire rich information on market needs from the existing large user base. Thus, small firms may follow larger rivals if they believe the latter to be better informed. Similarly, firms that have been successful in the past are considered to have any capability applicable to the current business and more likely to have their actions emulated.

A second economic theory of herd behavior is based upon the idea that managers ignore their own private information and imitate the decisions of others in an effort to avoid a negative reputation. By imitating, managers send signals to others about their own quality. Suppose that there are superior and inferior managers who have private information about investment. Outsiders do not know the type of each manager, but only that superior managers receive informative signals about the value of the investment while inferior managers receive purely noisy signals. Since the signals superior managers received might be misleading, outsiders cannot rely solely on the outcome of the investment, but also on behavioral similarity among managers. Therefore, in order to be evaluated as a superior type, managers ignore their own information and imitate others (Palley, 1995; Scharfstein & Stein, 1990). Such imitation serves to enhance the manager's "status," a point elaborated in the institutional theories discussed below.

Organization theory gives a related explanation for behavioral similarity or homogenization: institutional isomorphism. DiMaggio & Powell (1983) argue that rational actors make their organizations increasingly similar when they try to change them. This process of homogenization is captured by the concept of isomorphism. Isomorphism is a constraining process that forces one unit in a population to resemble other units that face the same set of environmental

conditions (Hawley, 1986).

Among several kinds of institutional isomorphism, mimetic isomorphism is the process whereby organizations model themselves on other organizations when the environment is uncertain. The modeled organization is perceived as more legitimate or successful. Such mimetic behavior is rational because it economizes on search costs to reduce the uncertainty that organizations are facing (Cyert & March, 1963). Empirical studies show the operation of mimetic isomorphism in a variety of organizational domains. For example, Fligstein (1985) applied the concept to explain the widespread adoption of the multidivisional structure; Haveman (1993) assessed the parallel diversification patterns of California savings and loan associations; and Greve (1995, 1996) considered format changes of radio stations.

While the economic theory of information cascades allows for the emergence of "fashion leaders," organizational sociologists have actually probed the issue of "who imitates whom." Sociological studies indicate that a given firm's propensity to be imitated increases with: (1) the information content of its signal (where actions by larger, more successful, or more prestigious firms may be seen as more informative) and (2) the focal firm's degree of contact and communication with other firms. Many studies have shown that organizations of larger size and profitability are more likely to be followed (e.g., Haunschild & Miner, 1997; Haveman, 1993).

Rivalry-based Theories

A second set of theories regards imitation as a response designed to mitigate competitive rivalry or risk. Firms imitate others in an effort to maintain their relative position or to neutralize the aggressive actions of rivals. Unlike the theories discussed in the previous section, firms' actions do not convey information on potential opportunities and threats in the market. The

theories relating to rivalry and risk have their primary origin in the fields of economics and business strategy.

Imitation to mitigate rivalry is most common when firms with comparable resource endowments and market positions face each other. Competition can be very intense in such cases, with prices and profits eroded easily (Peteraf, 1993). When resource homogeneity creates a potential for intense competition, matching behavior may be a way to enforce tacit collusion among rivals. Studies of repeated games show how "tit for tat" strategies can punish deviant behavior and thereby maintain cooperation (Axelrod, 1984). In his early work on strategic groups, Porter (1979: 217) suggested that firms within the same group behave similarly because "divergent strategies reduce the ability of the oligopolists to coordinate their actions tacitly … reducing average industry profitability." In other words, firms within the same strategic group may adopt similar behavior to constrain competition and maintain tacit collusion.[1]

More recent work in strategy and economics gives similar predictions. Studies on action-response dyads (Chen & MacMillan, 1992; Chen, Smith, & Grimm, 1992) suggest that matching a competitor's move indicates a commitment to defend the status quo, neither giving up the current position nor falling into mutually destructive warfare. Similarly, Klemperer (1992) shows that competitors may duplicate their product lines to mitigate rivalry. If firms offer identical product ranges, each consumer can avoid the costs of dealing with multiple firms by selecting a single supplier. This segmentation of customers may make the market less competitive.

The hypothesis that firms adopt similar behavior to mitigate rivalry can be also derived from studies on multimarket contact (Bernheim & Whinston, 1990; Karnani & Wernerfelt, 1985; Leahy & Pavelin, 2003). Edwards (1955) was the first to argue that multimarket contact might

[1] While strategic groups may be able to sustain tacit collusion in this way, firms within a strategic group typically experience more competition among their group members than with members of other strategic groups within the same industry (Greve, 1996).

blunt the edge of competition, because "A prospect of advantage from vigorous competition in one market may be weighed against the danger of retaliatory forays by the competitor in other markets." When firms compete with each other in many markets, they can more easily sustain collusion, because deviations in one market can be met by aggressive responses in many places. This is the idea of "mutual forbearance." The multimarket contact theories suggest two ways that competitors may imitate: (1) they may respond to a rival's aggressive move in one market with a similar move in another market; (2) they may match rivals' entry decisions in order to increase the degree of multimarket contact.

Other researchers have proposed that imitation stems from the desire of rivals to maintain relative competitive position. One of the first documented examples was the "bunching" of foreign direct investment (FDI), as rivals matched each other's entries into foreign markets. Knickerbocker (1973) argued that such "follow-the-leader" behavior is the result of risk minimization. If rivals match each other, none become better or worse off relative to each other. This strategy guarantees that their competitive capabilities remain roughly in balance. Motta (1994) gives a game theoretic explanation for this follow-the-leader behavior, and Head, Mayer & Ries (2002) show that it can be sustained only when managers are risk averse. Many empirical studies provide evidence on the existence of "follow-the-leader" behavior in foreign market entry (e.g., Knickerbocker, 1973; Flowers, 1976; Caves, Porter, Spence, & Scott, 1980; Yu & Ito, 1988; Yamawaki, 1998). Other studies in the strategic group literature (e.g., Fiegenbaum & Thomas, 1995; Garcia-Pont & Nohria, 2002) show that firms are likely to imitate other group members in an effort to maintain competitive parity.

Hypotheses

Both the information-based and rivalry-based theories give explanations on why firms behave similarly. However, each of them applies in different conditions and proposes that firms have different motives for imitation and they imitate different types of rivals. Information-based theories claim that firms in highly uncertain environment imitate rivals with rich information to economize information costs or get legitimacy. On the other hand, rivalry-based theories argue that firms facing intense competition among firms with comparable resources imitate similar rivals to mitigate rivalry or reduce risk.

To distinguish the theories, we have several hypotheses on what kind of firms are likely to be imitated. We draw from the idea that interorganizational influences are heterogeneous (Strang & Tuma, 1993; Greve, 1995, 1996; Gimeno, Hoskisson, Beal, & Wan, 1998; Bikhchandani *et al.*, 1992); some early movers may be more influential, and some late movers may be more susceptible to influence. This occurs in part because firms have different rivals and reference groups (Porac, Thomas, Wilson, Paton, & Kanfer, 1995; Fiegenbaum, Hart, & Schendel, 1996). One prediction of the information-based theories is that larger firms tend to be followed because larger firms are likely to have higher informational quality. High-status firms promote mimetic processes (Peteraf & Shanley, 1997) and are "fashion leaders" (Bikhchandani *et al.*, 1998).[2] Therefore, the information-based theories lead to the hypothesis that large firms are more likely to be imitated.

H1: Large firms are more likely to be imitated than small firms.

On the other hand, arguments on competitive rivalry predict imitative behavior among direct rivals. Conversely, even in the same industry, firms that compete less directly and pursue different goals are unlikely to imitate each other. Firms of similar size may be direct rivals (Porac *et al.*, 1995), in a sense that they have comparable resources, because firm size is an important

[2] Gilbert and Lieberman (1987) find that smaller firms follow larger firms to increase their capacity in the US chemical industries.

measure of firm capabilities. They are direct rivals also because a firm might lose its competitive position, unless the firm does not respond to the moves of others of similar size. Several studies on competitive interaction predict that large and small firms behave differently and therefore would be unlikely to follow each other.[3] Therefore, rivalry-based theories predict that firms of similar size are more likely to adopt similar behavior.

H2: Firms of similar sizes are more likely to be imitated than firms of different sizes.

The information- and rivalry-based theories described above are not mutually exclusive; both types of imitation may occur simultaneously. Thus, Lieberman & Asaba (2006) propose several criteria to distinguish between the theories. Among the criteria, degree of uncertainty has some power to distinguish between the two imitation motives. As studies of herd behavior and mimetic isomorphism mention, information-based motives are crucial when the environment is highly uncertain. The reason why firms imitate informative rivals is to reduce uncertainty by imitating them. On the other hand, rivalry-based motives are likely to dominate when the degree of uncertainty is moderate or low. Closely matched competitors often have similar information but strong rivalry. Multimarket contact further increases the likelihood of rivalry-based imitation, as it expands the domains where imitation can occur and raises the probability that firms respond to each other in kind. Firms that are closely matched may also be risk averse, particularly to loss of market share, a condition that may be necessary for some types of rivalry-based imitation.

Therefore, information-based theories explain more powerfully firms' imitative behavior in more uncertain contexts, while rivalry-based theories predict more powerfully firms' imitation in less uncertain contexts.

[3] Chen and Hambrick (1995) find that small firms differ in their competitive behavior from their large rivals in the US airline industry. Responsiveness to attacks, for example, is different between small and large firms, because large firms with more slack resources can retaliate (Smith *et al.*, 1991) and those with great reputations tend to respond to attacks in order to protect them (Fombrun and Shanley, 1990; Sobol and Farrelly, 1988).

H3a: Large firms are more likely to be imitated than small firms when environmental uncertainty is high.

H3b: Firms of similar sizes are more likely to be imitated than firms of different sizes when environmental uncertainty is moderate or low.

INDUSTRY DESCRIPTION, DATA, AND VARIABLES

Japanese Soft-drink Industries

In this study, we focus on new product introduction by Japanese soft-drink manufacturers. The Japanese soft-drink industry has grown rapidly, with high rates of new product introduction. From the mid 1980s to mid 1990s, 920 new soft drink products were, on an average, introduced annually in Japan, as compared to approximately 700 in the United States (Tollison, Kaplan, & Higgins, 1986).[4] In later years, more new products were introduced in Japan, and the average of annual new products between the mid 1990s to the late 2000s is 1280. For example, Asahi Beverage, the fifth largest manufacturer in Japan, has a product line including about 170 items and adds 40 new products annually.[5] Firms in the industry have created and expanded numerous new product categories such as RTD (ready-to-drink) coffee, RTD tea, sports drink, flavored water, and so on. Many marketers from the Asian and the European countries have visited Japan to observe the trend of the Japanese soft-drink market.

Table 1 shows the strong tendency of soft drink manufacturers to duplicate each other's product lines in Japan, as compared with such practices in the United States in early 1990s. The table denotes the offerings of the ten largest Japanese and US firms for ten selected products that

[4] Frequent new product introductions are requested in Japan by distribution channels, especially convenience stores, which account for about one-third of soft drink sales. To increase their sales, convenience stores ask soft-drink manufacturers to introduce new products, which the manufacturers advertise more than their existing products. Japanese beverage manufacturers also have their own vending machines, which account for half of total sales. In order to fill the machines with their own products, they have to offer many items.

[5] It is based on an interview conducted by one of the authors. Note that new product introductions include new package sizes as well as new flavors and formulas.

are available in both countries.

--- Insert Table 1 around here ---

Coca Cola, the largest soft drink producer (in both countries), offered all of the ten products in Japan. The table shows that seven competitors of Coke in Japan overlapped with Coke in at least nine of the product categories, and one firm (Pepsi) overlapped in seven categories. The producers in Japan cover 86 of the 100 possible firm-product pairs in Table 1, whereas the US producers show less than half as much product overlap (41/100).

Only one of the top Japanese producers, Otsuka Pharmaceutical, has avoided extensive duplication of competitors' lines. Otsuka does not introduce new products frequently. Most of its sales in the soft-drink business come from the two mega-hit products, "POCARI SWEAT" (sport drink) and "ORONAMIN C DRINK" (carbonated drink including many essential amino acids and vitamins), and the firm does not have a wide range of products. Otsuka tries to develop unique new products good for health without following fashions in the drink market.[6] Therefore, among the top Japanese drink firms, Otsuka is an exceptional firm that behaves differently from others.

In the US market by comparison, Coke and Pepsi have largely duplicated each other's products, but the other eight soft drink firms remain more specialized with little product overlap. Thus, except for the top two producers, there is little evidence that US soft drink firms have sought to mimic each other's product lines.

New products are introduced frequently in Japan, and fashions change every year. A typical example from the 1980s is a honey lemon drink. Nisshin Seiyu, (a producer of edible oils, with a small beverage business) introduced the first drink of this type, "HACHIMITSU DORI" (honey street), in 1985. The product gained popularity slowly, but once Suntory introduced

[6] It is based on the interview with Otsuka Pharmaceutical.

"HACHIMITSU LEMON" (honey lemon) in 1986, many firms followed. In 1989, 28 firms introduced this kind of product, and sales of honey drinks grew by 500% from the previous year. Figure 1 shows the rate at which firms entered the market for honey drinks over time. Other product categories such as canned RTD coffee, oolong tea, Japanese tea, canned RTD black tea, small bottled functional drink, and flavored water also came into fashion and attracted many firms.

--- Insert Figure 1 around here ---

Data and Variables

The primary data in this study are for new product introductions by the Japanese beverage manufacturers between the late 1970s and mid-2000s. We collected the data from the industrial journal, *Beverage Japan*, which annually reports the new products in the previous year, broken down by product category, firm, and month. All Japanese manufacturers that introduced more than ten new soft drink products during the observation period were identified and included in the sample. This criterion resulted in a sample of 49 manufacturers, which are listed in Table 2.

--- Insert Table 2 around here ---

We organized the observations on product introductions into two data sets that differ in their degree of product aggregation. The observation of the first data set is introduction of particular individual products while that of the second data set is introduction of various kinds of new products within several product categories. The first data set covers 46 products that were brand-new in terms of either flavor/ingredient or container and for which we were able to collect historical data going back to the very first introduction of the product by any firm in Japan. Some of the brand-new products became new product categories afterward. The other brand-new products were in existing categories but were novel in terms of a new container or a new flavor/ingredient

that had never been introduced in another category. The second data set covers new products within existing categories, including product renewals or minor changes of containers or flavors that had been tried before. The number of categories *Beverage Japan* reports varies year by year, and among them, we selected 12 categories that appear in most years.

Table 3 lists the names of the 46 brand-new products and the product categories in these two data sets. The 46 products are brand-new in several senses. The products such as sports drink and lactic acid bacteria drink are new products leading to individual product categories later on. The products such as apple tea and sports drink with amino acid are products of new flavor or new ingredients. The products such as carbonated drinks in 350ml can and 100% juices in a large-mouth bottle are new in terms of their containers. A product category, such as canned coffee, has varieties of products. Among them, there are several brand-new products in the sense described above. For example, the product, non-sugar coffee and coffee in a bottle can are included in the first data set, whereas small changes of canned coffee such as brand name change and package design change are in the second, more aggregate data set.

--- Insert Table 3 around here ---

While the observation of the two data sets is whether a firm introduced a product or not, the two data sets are also different in terms of the way to count introductions. In the first data set, we count an introduction of a specific product only. Moreover, we count it when a firm introduced the specific product for the first time. Even if a firm introduced the specific product repeatedly, namely product renewal, we count an introduction once at the very first time. In the second data set, on the other hand, we count any product introductions within a product category. Many firms introduced such new products every year or even every month. Thus, we count introductions of a firm repeatedly during the observation period.

Therefore, in the first data set, we examine firms' imitation of a specific new product, while we study firms' product proliferation in a product category in the second data set. The new products in the first data set are brand-new products in the market. Since the products with the new ingredient, flavor, or container have not been marketed before, it is highly uncertain whether the products will be sold successfully or not. Therefore, the firms that are planning to introduce the new products in the first data set are under quite uncertain environment. On the other hand, the demand for the new products in the second data set is to some degree certain, since the product categories already exist. Thus, the two data sets are also different in terms of uncertainty.

Data Set on New Products

We identify 46 products with complete historical data going back to the very first introduction by any firm in Japan. We run the Cox proportional hazards model to estimate the probability of new product introduction. For the hazard analysis, the data set includes 2254 observations, which is number of sample products (46) multiplied by number of sample firms (49)[7]. We use the Cox proportional hazards model (Cox & Oakes, 1990) to determine the influence of predictor variables on the time to product introduction by each firm. The hazard function is

$$h(TIME) = [h_0(TIME)]e^{(B_1X_1+B_2X_2+\ldots+B_pX_p)},$$

where $h_0(TIME)$ is the baseline hazard function when $X_1 \ldots X_p$ are set to 0. $X_1 \ldots X_p$ are predictor variables, $B_1 \ldots B_p$ are regression coefficients, and e is the base of the natural logarithm. *TIME* for each firm is the interval (in months) between the date when the first firm introduced the product and the date when the firm under observation did so. (*TIME* for the first introducers is 0.) The observations are right censored for firms that never introduced the product during the observation

[7] For the estimation, the observations of the initial introduction (*TIME*=0) are excluded, the number of observations used to estimate the probability is 2203.

period.

The measures used to test the hypotheses are based on the new product introductions by other firms in the sample during the prior six months. We adopted a six-month window because it takes up to six months for a firm to imitate a new product introduced by other firms.[8] First, we constructed a variable, $OTHERS_{i,k,s,t}$, which is the number of other firms that introduced the specific new product *k* during the previous six months of the observation month *s* in year *t*. Given that similar behavior is frequently observed among soft drink manufacturers, the coefficient of *OTHERS* would be more than one. However, similar behavior may not be imitation among firms but may be a simple common response to external shock. Therefore, to test the hypotheses, we examine if the introductions by firms of different sizes have a differential influence on imitation.

For this purpose, we classified the firms in the sample into four ranks based on their total soft drink sales, as indicated in Table 2.[9] The firms among the largest five are classified into the rank, TOP5. The sixth through the tenth largest firms are classified into the rank, TOP10. The eleventh through the twentieth largest firms are classified into the rank, TOP20. The firms beyond top twenty are classified into the rank, BELOW20. Then, we broke *OTHERS* into four different variables: *OTHERS1-5*, *OTHERS6-10*, *OTHERS11-20*, and *OTHERS21-49*. The variables are the number of the other firms which introduced the specific new product during the previous six months of the observation month among the firms of TOP5, among the firms of TOP10, among the firms of TOP20, and among the firms of BELOW20.

The analysis is composed of the five models. The first model is the analysis for the whole sample. The other four models are respectively for the four sub-samples: "1st-5th" is the sub-sample for the observations of the five largest firms, "6th-10th" is for the observations of the

[8] It is based on author's interview with marketing personnel in several Japanese beverage manufacturers.
[9] The largest 20 firms in the Japanese soft-drink market are listed in *Production and Sales Share in the Alcoholic Liquors and Food Industries*, Nikkan Keizai Tsushin-sha. The rank is quite stable during the observation period.

firms from the sixth largest to the tenth largest, "11th-20th" is for the observations of the firms from the eleventh largest to the twentieth largest, and "below 20th" is for the observations of the rest of the small firms (from the twenty first to forty ninth largest firm).

One of the control variables is $ORIGIN_{i,k,s,t}$, which is the average number of other firms from the same industry origin as the observation firm, which introduced the specific new product *k* during the previous six months of the observation month *s* in year *t*. The firms in the sample are classified into seven origins (*Alcohol*, *Beverage*, *Confectionery*, *Foods*, *Milk*, *Tea/Coffee*, and *Other*) as shown in Table 2. To enter a particular product market, firms should have a necessary set of resources and capabilities. Firms from the same industry origin are considered to have a similar set of resources and capabilities and therefore, can easily imitate each other, while firms from the different industry origins may not be able to imitate for lack of required resources. Thus, *ORIGIN* may control any effect of resource constraint, and is expected to have the coefficient more than one.

Moreover, we constructed a series of control variables. These include a product dummy and a month dummy. Further control variables include measures of market concentration and market growth. Market concentration ($CR_{k,t}$) is defined as cumulative concentration among the two largest firms in the product category to which the specific new product *k* belongs in year *t*.[10] We do not have any expectation about the coefficient. Market growth ($GROW_{k,t}$) is defined as follows,

$$GROW_{k,t} = [Q_{k,t} / Q_{k,t-1}] - 1$$

where $Q_{k,t}$ is the shipment for the product category to which the specific new product *k* belongs in year *t*.[11] In the study of new products, the market concentration and market growth of the

[10] The source of the data is *Production and Sales Share in the Alcoholic Liquors and Food Industries* (annual issues).
[11] The shipment data are collected either from *Production and Sales Share in the Alcoholic Liquors and Food Industries*, Nikkan Keizai Tsushin-sha or *Beverage Japan.* While it would be preferable to use a lagged market growth rate rather than the current rate, the data on market size do not exist prior to the initial introduction of the product, so it is impossible to define a lagged growth rate for the early observations of the sample. We did, however, test the lagged growth rate on the abbreviated sample and found little change in the results.

categories to which each new product is belonging are used. We expect that the coefficient of *GROW* is more than one. The correlation matrix and summary statistics are shown in panel A on the left side of Table 4.

--- Insert Table 4 around here ---

Data Set on Product Categories

The second data set is used to examine product proliferation within established product categories. The observation period is from January, 1986 to December, 2006. In each year, we have 7056 observations (12 categories * 49 firms * 12 month). In the early period, however, market growth or market concentration data for some of the 12 categories were not available (five categories in 1986, four categories in 1987, 1988, 1989, and 1990, and three categories in 1991 and 1992 are not available). Consequently, we have 132,300 observations. Among the 132,300 observations, frequencies of product introduction by year and by product category are indicated in Table 5.

--- Insert Table 5 around here ---

We estimated new product introduction by using a logit model. We set the binary dependent variable, $intro_{i,j,s,t}$ equal to 1 for all observations where firm *i* introduced a new product in category *j* during the observation month *s* in year *t*. This dependent variable can equal 1 repeatedly for a given firm, even within a product category. We constructed independent variables, *OTHERS*, *OTHERS1-5*, *OTHERS6-10*, *OTHERS11-20*, and *OTHERS21-49*, in the same way as the first data set.[12]

[12] For example, $OTHERS_{j,s,t}$ is defined as the number of new products in product category *j* introduced by (other) firms in the rank of TOP5 during the previous six months of the observation month *s* in year *t*.

As control variables, we constructed *ORIGIN*, *GROW*, and *CR* in the same way as before.[13] Also, category and month dummies were included. Moreover the annual average frequency of new product introduction ($AVEFREQ_{i,t}$) was constructed. This control variable is average number of new products introduced annually by firm *i* among the observation years except for year *t*.[14] This variable controls for the fact that firms have different average rates of new product introduction. The correlation matrix and summary statistics are shown panel B on the right side of Table 4.

Our predictions can be summarized as follows. If information-based explanations (*Hypothesis 1*) hold, we would see that product introduction of large firms promotes other firms' product introduction, while that of small firms does not. That is, in the hazard analysis, the coefficient of *OTHERS* of larger size would be significantly greater than one, while the coefficient of *OTHERS* of smaller size would be insignificant or less than one. Similarly, in the logit analysis, the variable, *OTHERS* of larger size would have a significantly positive coefficient, while *OTHERS* of smaller size would have an insignificant or negative coefficient. If rivalry-based theories (*Hypothesis 2*) hold, we would see product introduction of firms of similar size promotes other firms product introduction, while that of different size does not. Thus, the coefficient of *OTHERS* by size on the diagonal (that is, *OTHERS1-5* for sub-sample of 1st-5th, *OTHERS6-10* for sub-sample of 6th-10th, *OTHERS11-20* for sub-sample of 11th-20th, and *OTHERS21-49* for sub-sample of below 20th) would be significantly more than one (in hazard analysis) or significantly positive (logit analysis).

Moreover, given that the level of uncertainty between the two data sets is different, we can test *Hypothesis 3a* and *Hypothesis 3b*. If those hypotheses hold, we should see strong influence of larger firms and weak effect of smaller firms in the brand-new product imitation data set (high

[13] $ORIGIN_{i,j,s,t}$ is the average number of new products in product category *j* introduced by other firms from the same origin as the observation firm during the previous six months of the observation month *s* in year *t*.
[14] To avoid an identification problem, we took the average during observation periods except for the year *t*.

uncertainty), while the variables on the diagonal would show strong effects and all the larger firms do not have strong effects in the product proliferation data set (low uncertainty).

RESULTS

The results of the analyses of product introduction for the two data sets are shown in Table 6. While the explanatory variables are almost identical, the results should be interpreted differently for the two data sets, given that the statistical methods, dependent variables and level of data aggregation differ. In panel A on the left side the table, factors that influence a firm's decision to make its first entry into a new product market are indicated. Panel B, on the right side, sheds light on more general decisions to proliferate products within an established product category. Many of the latter introductions involve relatively incremental product changes. These two types of product introduction may be influenced by different factors, given that a firm's first entry into a new product market is generally a more uncertain step.

--- Insert Table 6 around here ---

Firms by Size Category

The results of hazard analysis on firm's initial entry into new product markets are reported in the left side of Table 6. Model (1) includes *OTHERS*, while in the other models, *OTHERS* is broken down into four different variables: *OTHERS1-5*, *OTHERS6-10*, *OTHERS11-20*, and *OTHERS21-49*. Each model includes such control variables as *GROW*, *CR*, *ORIGIN*, category dummies and month dummies.

Model (1) is for the whole sample, while models (2) through (5) are for the four sub-samples: 1st-5th, 6th-10th, 11th-20th, and below 20th. In Model (1), the coefficient of *OTHERS* is more than one and significant. Therefore, firms were more likely to enter a new product market when

many other firms were observed to have entered in recent months. However, this result does not necessarily mean that firms imitated other companies, as they might have all been responding to the same external stimulus or shock. The coefficient of *ORIGIN* is also more than one and significant. As stated in the previous section, firms from the same industry origin are considered to have a similar set of resources and capabilities and therefore, can easily imitate each other. Thus, *ORIGIN* controls for the effect of resource constraint. The coefficient of *GROW* is more than one and significant, suggesting that many firms enter into growing product markets. The coefficient of *CR* is less than one and significant, suggesting that firms are less likely to enter into product markets that are more concentrated.

The results of *OTHERS* by size are shown in Model (2) to Model (5). Significant coefficients exceeding one are found for *OTHERS1-5* in three models, *OTHERS6-10* in two models, and *OTHERS11-20* in three models. *OTHERS21-49*, on the other hand, is less than one in Model (2), and significantly positive only in Model (5). Thus, larger firms tend to be followed by other firms, while smaller firms do not. These results are consistent with *Hypothesis 1*.

As to the variables on diagonal, *OTHERS1-5* in Model (2), *OTHERS6-10* in Model (3), and *OTHERS21-49* in Model (5) are significantly positive, while *OTHERS11-20* in Model (4) is positive but insignificant. Therefore, we have some supportive evidence for *Hypothesis 2*.

The results of logit analysis for product proliferation data set are reported in the right side of Table 6. As the analysis for brand-new product imitation data set, Model (6) is for the whole sample, while the other models are for the four sub-samples. The results of *OTHERS* by size are found from Model (7) to Model (10). *OTHERS21-49* is negative in three models and significantly positive only in Model (10) which is similar to the previous analysis. *OTHERS1-5*, *OTHERS6-10*, and *OTHERS11-20* are significantly positive in two of the four models. Thus, the cases of

significantly positive coefficients are fewer than in the previous analysis. Moreover, interesting difference between the analyses of the two data sets is found in Model (15). In this model, *OTHERS1-5* and *OTHERS6-10* are significantly negative. That is, larger firms are significantly unlikely to be followed by small firms. Therefore, the results are not consistent with *Hypothesis 1*.

As to the variables on diagonal, *OTHERS1-5* in Model (7), *OTHERS6-10* in Model (8), and *OTHERS21-49* in Model (10) are significantly positive, while *OTHERS11-20* in Model (9) is positive but insignificant. As in the previous analysis, therefore, we have some supportive evidence for *Hypothesis 2,* that firms follow others of similar size.

The contrasting results between the two data sets supports *Hypotheses 3a and 3b*, and can be interpreted as follows. In the case of brand-new products, firms tended to enter new beverage markets when they observed entry by the largest soft drink companies. Larger firms have better market access and can afford product development and marketing research; as a consequence, they may have superior information and understanding of the market. In the case of brand-new products, firms face much uncertainty; to deal with this uncertainty, firms tend to follow the most informative firms. That is, information-based motives are dominant in brand-new product imitation.

On the other hand, more general product proliferation in existing product categories seems to have been stimulated by the observed behavior of other firms of similar size. Since firms of similar size tend to regard each other as direct rivals, they may try to duplicate their product line to avoid being preempted. However, such product proliferation seems not to have been influenced by the observation of largest firms' product proliferation. Because product proliferation is in existing product categories, firms do not face much uncertainty, and they do not have to do vicarious learning as much as in the context of brand-new product imitation. That is, rivalry-based motives are dominant in product proliferation in existing product categories.

Leadership Score Analysis

While the above analyses show that in the context of brand-new product imitation, large firms tend to be followed, are all the larger firms equally influential? To explore the effect of large firms, we did different analyses. First, to be followed by others, firms have to introduce a new product earlier than others. Among the large firms, who leads in the race of new product introduction?

To examine this, we calculated "Leadership Scores" for each of the top 10 firms as follows. Taking these firms in pairs, we examined which firm introduced each of the new products earlier. For example, in Table 7, 0.37 in the first column and the second row is Coke's winning frequency, which is the number of products Coke introduced earlier than Suntory, divided by the number of products introduced by both Coke and Suntory among the 46 products in the brand-new product imitation data set. 0.51 at the bottom of the first column is Coke's leadership score, which is summation of Coke's winning frequency divided by 9 (the number of other largest firms).

According to the table, five firms, Coke, Kirin, Suntory, Asahi, Itoen, and Pokka get the score more than 0.5. Suntory gets the highest Leadership Score (0.61) which suggests that Suntory won the race most frequently. Itoen is the second and Asahi is the third. Among the ten largest firms, Otsuka gets the lowest score (0.21). Otsuka, originally a pharmaceutical firm, is known for their unique and small number of mega hits such as POCARI SWEAT and ORONAMIN C DRINK. The firm tries to differentiate it from others and does not introduce new products frequently. Despite its ranking in the top five, Otsuka seems to be in a different competition from other drink manufacturers. We also note that Coke, despite its dominant market share, has a leadership score below that of the other top six firms except Otsuka.

--- Insert Table 7 around here ---

Individual Large Firm Analysis

Our second analysis to more finely examine the effect of large firms is to repeat the hazard and logit analyses of Table 6, replacing the *OTHERS1-5* measure with individual firm dummies. Accordingly, we constructed dummy variables of each largest five firms, *COKE, ASAHI, KIRIN, OTSUKA* and *SUNTORY*. Each dummy variable equals one if that firm introduced the specific new product during the six months prior to the observation, and 0 otherwise. With these individual firm dummy variables, we can examine which of these largest firms was more likely to be followed.

The results are shown in Table 8. The results of hazard analysis on firm's initial entry into new product markets are reported in the left side of the table. *KIRIN* and *SUNTORY* are more than one and significant in four of the five models. These two firms are followed by other largest firms as well as smaller firms. *ASAHI* is more than one and significant in three of the five models. Asahi is not followed by other largest firms, but by smaller firms. Remarkably, *COKE* is not significant in any models, and is less than one in three of the five models. Thus, Coke's new product introduction is not influential in others' decision to enter new product markets. Not surprisingly, the coefficients for *OTSUKA* are all less than one, and significant in most models.

--- Insert Table 8 around here ---

Thus, the results in Table 8A show that not all of the largest firms were followed in their new product introductions. Otsuka's new products were significantly less likely to be imitated, reflecting the firm's highly differentiated strategy and constraints on the capabilities of other firms to imitate Otsuka. The findings for Coke are consistent with the idea that as a dominant firm, it may have been in Coke's interest to act as a follower rather than take the risk of attempting to be an

innovation leader.

The results of logit analysis for the product proliferation data set are reported in Table 8B. The variables, *OTHERS6-10, OTHERS11-20,* and *OTHERS21-49* have coefficients similar to those in Table 6B considered previously. Model (17) gives evidence that the five largest firms were more likely to follow incremental product introductions by Suntory and Otsuka, and less likely to follow Coke, Kirin and Asahi. Model (20) implies that the smallest firms were unlikely to follow Coke and Otsuka, but more likely to follow Asahi. However, the significance levels of these individual firm coefficients in Model (20) are low, and their net effect seems consistent with the small negative coefficient shown for the largest firms as a group in Model (10).

DISCUSSIONS AND CONCLUSION

This study has considered the reasons why firms may imitate their rivals. Using data on new product introductions among the Japanese soft-drink manufacturers, we have attempted to distinguish among two sets of theories: those implying that imitation economizes on information costs, and those that yield such behavior as the result of competitive interaction.

The empirical results provide support for both sets of theories, but in different contexts. The analysis of firms' initial entry into brand-new products suggests that firms enter when they observe larger competitors doing so. Entry by large firms may provide information that demand for the product is likely to grow; indeed, entry by large firms may give legitimacy to the product and stimulate consumer demand. On the other hand, in case of product proliferation within established product categories, product introduction of large firms does not promote product introduction of the other firms. Rather, firms often mimic others of similar size, which are regarded as direct rivals. One interpretation is that the bunching of entry into emerging product markets is

largely the result of economizing on information costs, whereas the bunching of product introductions within established categories is caused more by competitive interaction.

These contrasting results are reasonable. In the case of a brand-new product, it is uncertain whether the product will sell well or not. In such a highly uncertain situation, firms try to acquire information by looking at larger firms, which are expected to have more or better information. Therefore, firms are more likely to introduce a new product when they observe that one or more of the largest five firms have done so. In other words, larger firms are "fashion leaders" (Bikhchandani *et al*., 1998).[15]

In the case of product proliferation within an established product category, on the other hand, the firm is certain that the category exists. Rather, the firm might be afraid that new product introductions by rivals could damage the firm's position within the category. If they did not imitate rivals' product proliferation, their market would be preempted and the competitive balance would be destroyed. The findings suggest that temporal clustering of product introductions within existing categories arises largely because firms follow competitors with similar size and in the same rank.

Moreover, the analysis including dummy variables of each largest firm and leadership score analysis found that all the five largest firms do not behave in the same way or are not equally informative. Kirin and Suntory are certainly informative players which tend to be followed by other firms. They have introduced many successful new products and are large enough to be fashion leaders. Otsuka is also one of the largest firms due to a few mega-hit products, but does not

[15] The Other interpretations are possible. For example, large firms may be followed not because they are informative but because they stimulate consumer demand. Large firms can spend much in advertising and sales promotion, which stimulate consumer demand. Small firms might know that the market will become large when they observe large firms entering the new product market. Small firms might free ride on large firms' effort to stimulate demand. However, this is also a part of the information-based theories. Entry by large firms reveals information on the growth potential of the market, even if this growth arises mostly from promotional activities undertaken by these firms.

introduce new products frequently. The firm tries to differentiate it from others by developing unique products and seems to be in a different competition from other drink manufacturers. Consequently Otsuka is not likely to be followed by others.

Although it is by far the largest beverage firm in Japan, our findings show that Coke was not likely to be followed by other beverage companies. This lack of imitation applied to both brand-new products and incremental product changes. In Japan, Coke's strategy has been to closely monitor other firms' product introductions. Once one of them proves successful, Coke quickly introduces the product and robs the first movers of the market by huge promotion and advertising efforts. According to some studies of marketing and game theories, such a fast follower strategy is reasonable for a dominant leading firm (Schnaars, 1994: Dixit & Nalebuff, 1991).

Industries evolve as some firms innovate and the other firms imitate. Such interactions among rivals can be very complicated. As Christensen (1997) describes, for example, firms with large market share are not necessarily first movers and small firms are not necessarily followers. Imitations are also not also so simple. The mechanisms, pattern, and motives are diverse. This study tried to distinguish among the alternative theories on imitation. We find general support for our three hypotheses but important exceptions when we examine the data at the level of individual firms. Although our ability to distinguish among theories and assess the behavior of individual firms is limited in extent, this study is one of the first to attempt such assessments empirically. Despite the limitations, we have demonstrated dynamic competition caused by the different nature and behavior of leading firms versus small firms, as well as differences among leading firms.

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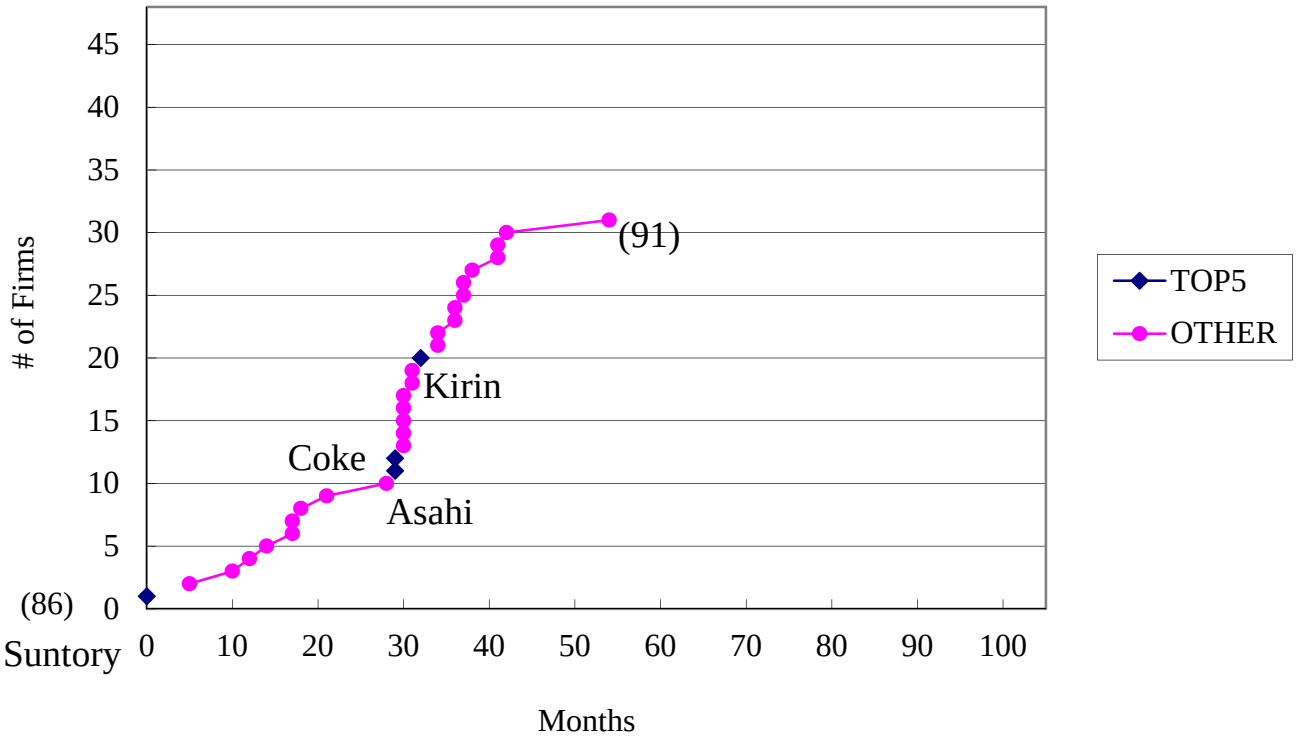
TABLE 1: Japan-US Comparison of Product Line Duplication in 1990s

JAPAN	Coca Cola	Otsuka	Suntory	Kirin	Asahi	Dydo	UCC	Pokka	Pepsi	Calpis	
Cola	X				X	X	X	X	X	X	7/10
Lemon Lime	X		X	X	X	X	X	X	X	X	9/10
Orange Drink	X		X	X	X	X	X	X	X	X	9/10
Sports Drink	X	X	X	X	X	X	X	X	X	X	10/10
RTD Tea	X	X	X	X	X	X	X	X	X	X	10/10
100% Juice	X		X	X	X	X	X	X		X	8/10
PET Bottled Water	X		X	X	X			X		X	6/10
Flavored Water	X		X	X	X	X	X	X			7/10
Sparkling Fruit Drink	X	X	X	X	X	X	X	X	X	X	10/10
RTD Coffee	X	X	X	X	X	X	X	X	X	X	10/10
Market Share	35.5	7.5	7.7	6.7	4.8	4.4	3.5	3.5	2.7	3.0	

US	Coca Cola	Pepsi	Dr. Pepper	Seven Up	Cadbury Schwepps	Royal Crown	A&W	Monarch	National Beverage	Double Cola	
Cola	X	X		X		X				X	5/10
Lemon Lime	X	X		X	X		X	X	X	X	8/10
Orange Drink	X	X			X						3/10
Sports Drink	X	X	X						X		4/10
RTD Tea	X	X							X		3/10
100% Juice	X	X	X								3/10
PET Bottled Water		X									1/10
Flavored Water					X				X		2/10
Sparkling Fruit Drink	X	X			X			X			3/10
RTD Coffee		X									1/10
Market Share	39.3	30.7	5.4	5.1	3.9	2.9	1.5	1.8	2.3	0.5	

Source: For Japan, *Beverage Japan and Production and Sales Share in the Alcoholic Liquors and Food Industries in several years*.
For the US, *Beverage World* and *Beverage Industry Annual Manual* in several years.
Market share is the average of those in 1989 through 1994 for Japan and in 1984 through in 1990 for the US.

FIGURE 1: Diffusion of Honey Lemon Drink



Note: Suntory introduced this product earliest among the firms in our sample. But the innovator (the firm that introduced this product for the first time) is Nisshin Seiyu, which is not in our sample.

TABLE 2: The List of the Firms in the Sample

FIRM	ORIGIN	RANK[a]	Introduction 1[b]	Introduction 2[c]
Suntory	Alcohol	TOP5 (2)	45	640
Kirin	Alcohol	TOP5 (3)	45	641
Asahi	Alcohol	TOP5 (5)	43	670
Sapporo	Alcohol	TOP20 (14)	41	460
Takara	Alcohol	BELOW20	30	267
Godo Seishu	Alcohol	BELOW20	17	14
Coca Cola	Beverage	TOP5 (1)	42	681
Dydo	Beverage	TOP10 (7)	23	527
Calpis	Beverage	TOP10 (8)	14	489
Pepsi	Beverage	TOP10 (9)	24	123
Pokka	Beverage	TOP10 (10)	40	387
Yakuruto	Beverage	TOP20 (15)	32	185
Cherio	Beverage	BELOW20	40	86
Sangalia	Beverage	BELOW20	40	415
Kinki Sain	Beverage	BELOW20	12	20
Maruzen-shokuhin	Beverage	BELOW20	13	33
Cadburry	Beverage	BELOW20	9	16
Prio	Beverage	BELOW20	5	7
Morinaga Seika	Confectionery	TOP20 (20)	22	108
Fujiya	Confectionery	BELOW20	9	105
Meiji Seika	Confectionery	BELOW20	20	59
Lotte	Confectionery	BELOW20	15	54
Kagome	Foods	TOP20 (12)	37	208
SB	Foods	BELOW20	10	20
Kikkoman	Foods	BELOW20	14	79
Meiji-ya	Foods	BELOW20	15	24
Ajinomoto	Foods	BELOW20	30	161
Yukijirushi Shokuhin	Foods	BELOW20	22	36
Yamazaki-pan	Foods	BELOW20	14	18
House	Foods	BELOW20	39	82
Nagano Tomato	Foods	BELOW20	12	15
Meiji Nyugyo	Milk	TOP20 (16)	36	467
Morinaga Nyugyo	Milk	TOP20 (17)	28	451
Yukijirushi Nyugyo	Milk	TOP20 (19)	16	341
Takanashi Nyugyo	Milk	BELOW20	10	78
Ito-en	Tea/Coffee	TOP10 (6)	8	545
UCC	Tea/Coffee	TOP20 (11)	34	211
Mitsui Norin	Tea/Coffee	BELOW20	17	46
Art Coffee	Tea/Coffee	BELOW20	14	30
Nestle	Tea/Coffee	BELOW20	30	151
Otsuka	Other	TOP5 (4)	23	105
JT	Otthers	TOP20 (13)	34	357
Kanebo	Other	TOP20 (18)	23	123
Takeda	Other	BELOW20	16	44
Shiseido	Other	BELOW20	13	30
Nihon Seikyo	Other	BELOW20	13	24
Zenkoku-Nokyo	Other	BELOW20	17	161
JR Kyushu	Other	BELOW20	43	10
JR Higashi	Other	BELOW20	8	40

a: The number in parentheses is the rank of the firm.
b: The Number is brand-new products introduced.
c: The Number is the frequency of new product introduction in the product categories of duplication data set. It can be less than ten, because it is not all the introductions.

TABLE 3: Product Categories and Brand-new Products in the Sample

CATEGORY	BRAND-NEW PRODUCT		
	New Categoy	New Flavor/Ingredient	New Container
Carbonated Drink with No Juice		6 Grapefruit flavor 7 With artificial sweetener	28 350ml can
Carbonated Drink with Juice		8 With lemon juice 9 With grape juice 10 With more than 10% juice	
100% Juice		11 Carrot juice 12 Fruit vegetable mix	29 Large mouth bottle
1-99% Juice		13Honey lemon 14Plum juice 15Peach juice	30 PET bottle
Green Tea		16With GYOKURO (premium leaf)	31 PET bottle 32 Can 33 Bottle can 34 500ml PET
Black Tea	1 Black tea 2 Oolong tea	17Apple tea 18 Peach tea	35 PET bottle 36 500ml PET
Oolong Tea		19 With FUKKEN-SHO Leaf	37 PET bottle 38 Bottle can 39 500ml PET
Other Tea		20 MUGI tea 21 Blend tea	40 PET bottle 41 500ml PET
Coffee		22 No sugar 23 Café Au late 24 With special beans	42 Bottle can 43 190ml can
Sports Drink	3 Sports drink	25 With amino acid	44 500ml PET
Milk Drink	4 Lactic acid bacteria drink	26 With Juice	45 Plastic cup
Water	5 Mineral water	27 Flavored water	46 500ml PET

TABLE 4: Mean, Standard Deviation, and Correlation Matrix for the Two Data Sets

A. Brand-new Product Data Set

	1	2	3	4	5
1 *time*	1				
2 *OTHERS*	−0.4096	1			
3 *ORIGIN*	−0.2794	0.5756	1		
4 *CR*	0.2147	−0.1858	−0.1144	1	
5 *GROW*	−0.238	0.1409	0.1053	−0.0043	1
# Obs.	2254	2254	2254	2253	2253
Min	0	0	0	20.200	−0.2766
Max	360	13	1	97.500	12.2615
Mean	149.5896	0.9574	0.0218	57.5008	0.1635
Std Dev.	105.1570	1.8886	0.0723	17.2219	0.6356

B. Product Proliferation Data Set

	1	2	3	4	5	6
1 *intro*						
2 *OTHERS*	0.1222					
3 *ORIGIN*	0.1629	0.5342				
4 *AVEFREQ*	−0.0027	−0.0111	0.0082			
5 *CR*	−0.0212	−0.1200	−0.0064	0.0162		
6 *GROW*	0.0030	−0.0059	−0.0031	−0.0238	0.0616	
# Obs.	176007	162288	162288	162288	137592	132888
Min	0	0	0	0	19.4	−0.2779
Max	14	64	5.3333	114	95	7.6667
Mean	0.0561	17.0399	0.3480	16.3700	57.8308	0.1304
Std Dev.	0.2343	12.4323	0.4724	16.7889	16.9002	0.5534

TABLE 5: Product Introductions by Year and by Category

Category ＼ Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Carbonated drink with juice	31	26	34	36	30	35	24	22	18	20	27	22	25	24	19	19	27	34	29	41	50	593
Carbonated drink with no juice	23	14	17	16	20	25	21	22	25	19	30	21	27	12	20	16	11	13	18	26	28	424
100% juice	12	28	46	42	35	21	26	42	47	38	40	29	36	36	39	44	35	46	45	59	55	801
Less than 100% juice	45	55	69	70	79	39	51	73	75	63	56	67	63	72	86	89	96	89	92	102	99	1530
Green tea	5	2	10	8	14	12	21	19	11	11	16	13	14	12	18	33	54	45	43	36	46	443
Black tea	15	20	28	47	46	27	15	20	23	34	39	34	31	31	22	31	30	31	37	32	35	628
Oolong tea	29	25	31	16	18	12	14	10	11	12	12	9	6	6	9	11	11	28	15	12	9	306
Other tea	11	2	19	8	9	9	11	18	15	25	20	26	26	32	20	20	31	33	43	44	40	462
Coffee	31	60	65	57	54	42	40	45	47	52	48	44	48	52	46	57	62	72	82	75	77	1156
Milky drink	14	20	29	38	42	63	43	33	48	40	48	40	54	67	55	66	58	72	80	89	82	1081
Sport drink	20	32	38	47	37	23	14	29	21	22	31	20	29	35	19	30	60	49	68	55	50	729
Mineral water	6	8	3	3	5	8	11	7	6	4	8	7	6	7	7	6	6	11	13	7	11	150
Total	242	292	389	388	389	316	291	340	347	340	375	332	365	386	360	422	481	523	565	578	582	8303

TABLE 6: Results of Hazard and Logit Analyses

A. Brand-new Product Imitation

	(1) Whole	(2) 1st-5th	(3) 6th-10th	(4) 11th-20th	(5) below 20th
GROW	1.57***	1.54*	1.74*	1.67***	1.74***
	(0.06)	(0.33)	(0.55)	(0.14)	(0.13)
CR	0.98***	0.97*	0.97*	0.98*	0.98**
	(4.04E-03)	(0.01)	(0.01)	(0.01)	(0.01)
ORIGIN	2.13*	0.94	0.48	33.22***	0.93
	(0.77)	(1.03)	(0.85)	(33.07)	(0.50)
OTHERS	1.16***				
	(0.02)				
OTHERS1-5		1.60*	1.07	1.50***	1.31*
		(0.36)	(0.21)	(0.18)	(0.14)
OTHERS6-10		1.52*	1.47*	1.18	1.17
		(0.27)	(0.27)	(0.15)	(0.11)
OTHERS11-20		1.48*	1.36*	1.11	1.24**
		(0.23)	(0.20)	(0.10)	(0.09)
OTHERS21-49		0.92	1.13	1.08	1.15***
		(0.09)	(0.13)	(0.07)	(0.05)
NOB	2203	217	218	449	1319
Log Likelihood	-6604.25	-748.00	-693.09	-1408.0854	-2261.96

B. Product Proliferation

	(6) Whole	(7) 1st-5th	(8) 6th-10th	(9) 11th-20th	(10) below 20th
Constant	-5.68***	-4.82***	-5.54***	-6.32***	-5.43***
	(0.13)	(0.26)	(0.32)	(0.31)	(0.27)
GROW	0.03*	0.01	2.39E-03	0.03	0.13***
	(0.02)	(0.05)	(0.04)	(0.03)	(0.03)
CR	-1.53E-03	0.01*	2.68E-03	-4.40E-03	-0.02***
	(1.78E-03)	(3.78E-03)	(4.39E-03)	(3.71E-03)	(3.74E-03)
AVEFREQ	-1.34E-03*	-2.41E-03	7.39E-03***	7.27E-03***	-0.01***
	(7.12E-04)	(2.10E-03)	(1.92E-03)	(1.73E-03)	(1.39E-03)
ORIGIN	0.80***	0.45***	-1.13***	0.79***	0.58***
	(0.02)	(0.06)	(0.12)	(0.04)	(0.05)
OTHERS	2.67E-03				
	(1.69E-03)				
OTHERS1-5		0.07***	0.05***	4.68E-03	-0.02*
		(0.01)	(0.01)	(0.01)	(0.01)
OTHERS6-10		0.02	0.11***	0.02*	-0.04**
		(0.01)	(0.02)	(0.01)	(0.01)
OTHERS11-20		0.02	0.04***	0.01	0.02*
		(0.01)	(0.01)	(0.01)	(0.01)
OTHERS21-49		-0.04***	-5.31E-04	-0.02**	0.03***
		(0.01)	(0.01)	(0.01)	(0.01)
NOB	132300	13500	13500	27000	78300
Log Likelihood	-26497.35	-5133.71	-4318.84	-6464.79	-7389.80

*: 10%, **1%, ***0.1%. Standard errors are in parentheses.
Category dummy and month dummy are included but not reported.

TABLE 7: Leadership Score

			Leader									
			Coke	Suntry	Kirin	Otsuka	Asahi	Ito-en	Dydo	Calpis	Pepsi	Pokka
			1	2	3	4	5	6	7	8	9	10
Follower	Coke	1		*0.63*	0.55	**0.14**	0.56	**0.67**	0.46	0.47	0.41	0.49
	Suntry	2	*0.37*		0.42	**0.27**	0.52	0.47	*0.38*	0.43	**0.22**	*0.38*
	Kirin	3	0.45	0.58		**0.18**	0.38	0.56	0.45	0.46	0.55	0.41
	Otsuka	4	**0.86**	**0.73**	**0.82**		**0.76**	**0.82**	**0.86**	*0.70*	0.69	**0.91**
	Asahi	5	0.44	0.48	*0.63*	**0.24**		0.54	**0.34**	**0.33**	0.43	0.43
	Ito-en	6	**0.33**	0.53	0.44	**0.18**	0.46		**0.33**	0.42	0.45	0.42
	Dydo	7	0.54	*0.62*	0.55	**0.14**	**0.66**	**0.67**		0.55	0.57	0.53
	Calpis	8	0.53	0.57	0.54	*0.30*	**0.67**	0.58	0.45		0.52	0.50
	Pepsi	9	0.59	**0.78**	0.45	0.31	0.57	0.55	0.43	0.48		0.57
	Pokka	10	0.51	*0.62*	0.59	**0.09**	0.57	0.58	0.47	0.50	0.43	
	Leadership Score		0.51	0.61	0.56	0.21	0.57	0.60	0.46	0.48	0.47	0.51

Significant at the .01 level, 2-tailed test.

Significant at the .05 level, 2-tailed test.

Significant at the .10 level, 2-tailed test.

TABLE 8: Effects of Each Large Firm Dummy

A. Brand-new Product Imitation

	(11) Whole	(12) 1st-5th	(13) 6th-10th	(14) 11th-20th	(15) below 20th
GROW	1.65***	1.64*	1.86*	1.72***	1.84***
	(0.08)	(0.36)	(0.59)	(0.15)	(0.16)
CR	0.98***	0.98*	0.97*	0.98*	0.98***
	(4.00E-03)	(0.01)	(0.01)	(0.01)	(0.01)
ORIGIN	2.15*	0.05*	0.83	35.78***	0.91
	(0.78)	(0.07)	(1.65)	(37.16)	(0.50)
OTHERS	1.14***				
	(0.02)				
COKE	0.88	1.86	0.94	1.20	0.84
	(0.12)	(0.89)	(0.36)	(0.29)	(0.19)
KIRIN	1.28*	9.52***	0.56	1.82*	1.48*
	(0.16)	(5.08)	(0.26)	(0.57)	(0.27)
SUNTORY	1.47**	1.87*	1.83*	1.43	2.03***
	(0.18)	(0.62)	(0.61)	(0.39)	(0.44)
OTSUKA	0.45**	0.18*	0.20**	0.91	0.56
	(0.12)	(0.15)	(0.12)	(0.42)	(0.38)
ASAHI	1.25	2.31	4.34***	1.74*	1.24
	(0.19)	(1.21)	(1.85)	(0.48)	(0.38)
OTHERS6-10		1.81***	1.29	1.19	1.14
		(0.33)	(0.25)	(0.16)	(0.12)
OTHERS11-20		1.91***	1.28*	1.10	1.28***
		(0.32)	(0.18)	(0.10)	(0.09)
OTHERS21-49		0.89	1.36**	1.06	1.15***
		(0.10)	(0.16)	(0.07)	(0.05)
NOB	2203	217	218	449	1319
Log Likelihood	-6588.71	-738.42	-681.12	-1406.27	-2256.35

B. Product Proliferation

	(16) Whole	(17) 1st-5th	(18) 6th-10th	(19) 11th-20th	(20) below 20th
CONSTANT	-5.43***	-4.61***	-5.30***	-5.94***	-4.98***
	(0.12)	(0.23)	(0.31)	(0.28)	(0.24)
GROW	0.03*	0.01	0.01	0.05	0.13***
	(0.02)	(0.05)	(0.04)	(0.03)	(0.04)
CR	1.09E-04	0.01**	3.19E-03	-4.70E-03	-0.03***
	(1.81E-03)	(3.86E-03)	(4.44E-03)	(3.75E-03)	(3.79E-03)
AVEFREQ	-1.30E-03*	-4.16E-03*	0.01***	0.01***	-0.01***
	(7.13E-04)	(2.21E-03)	(1.94E-03)	(1.74E-03)	(1.39E-03)
ORIGIN	0.81***	0.69***	-1.14***	0.79***	0.58***
	(0.02)	(0.06)	(0.13)	(0.04)	(0.05)
OTHERS	0.02***				
	(2.24E-03)				
COKE	-0.10***	-0.14***	0.07*	-0.01	-0.05*
	(0.01)	(0.02)	(0.03)	(0.03)	(0.03)
KIRIN	-0.04***	-0.06**	0.03	0.04*	0.02
	(0.01)	(0.02)	(0.03)	(0.02)	(0.03)
SUNTORY	-0.03*	0.06**	0.02	-0.05*	-0.02
	(0.01)	(0.02)	(0.03)	(0.02)	(0.03)
OTSUKA	0.08**	0.36***	0.05	0.02	-0.14*
	(0.03)	(0.05)	(0.06)	(0.05)	(0.06)
ASAHI	-0.02*	-0.05*	0.08**	0.05*	0.05*
	(0.01)	(0.02)	(0.03)	(0.02)	(0.03)
OTHERS6-10		0.06***	0.11***	0.02	-0.04**
		(0.01)	(0.02)	(0.01)	(0.01)
OTHERS11-20		0.04***	0.04***	0.01	0.02*
		(0.01)	(0.01)	(0.01)	(0.01)
OTHERS21-49		-0.05***	3.20E-03	-0.02*	0.03***
		(0.01)	(0.01)	(0.01)	(0.01)
NOB	132300	13500	13500	27000	78300
Log Likelihood	-26459.86	-5117.75	-4320.98	-6466.35	-7389.42

*: 10%, **1%, ***0.1%. Standard errors are in parentheses.
Category dummy and month dummy are included but not reported.