研究紀要，52･53，79～109

An Investigation into the Nature of the Cost of Distribution and the Cost of Manufacture using data on a Company-Basis through 1986, 1996 and 2006 in Japan

Hiroaki SETO*

要約

著者はメーカ粗マージン、メーカ自身の流通費、卸商粗マージン、小売商粗マージンを1986年、1996年そして2006年を通じて、カンパニィベイシス・データを用いて、研究してきた。著者はこれらの三つの年に同じメーカを訪問した。著者は、流通費―これはメーカ自身の流通費、卸商粗マージンそれに小売商粗マージンから成るのであるが―と製造原価の間の関係を研究してきた。研究には、流通費（説明変数）と製造原価（被説明変数）の間の回帰関係を、1986年と1996年については、研究した。しかしながら、2006年データについては、回帰分析は不可能であった。この困難は、しかしながら、AIC（赤池の情報量基準）を用いて解決される機会にもなった。

キーワード：粗マージン、流通費、製造原価、小売商

(Abstract)

The author investigated the manufacturer's gross margin, manufacturer's own distribution cost, wholesaler's and retailer's gross margins in 1986, 1996 and 2006 on a company basis. He visited the same manufacturers in 1996 and 2006 as visited in 1986. He investigated the relationship between the cost of distribution, which consists of manufacturer's own distribution cost, wholesaler's and retailer's gross margins, and the cost of manufacture using regression for the data of 1986 and 1996, but the regression analysis could not be applied to data for 2006. This difficulty becomes, however, an opportunity to resolve the problem using AIC (Akaike Information Criterion) because it turned out that the data of 2006 contain two different characters.

Keywords: margin, cost of distribution, cost of manufacture, retailer

---

* 提出年月日2009年８月17日

The author would like to thank all of the companies he visited, David Johnson, and the Central Library of Takamatsu University for their great assistance. Michio Honda, Professor of Information Science at Kagawa University, was kindly enough to let the author use his Emacs to write the manuscript.

Ⅰ. METHOD OF INVESTIGATION IN ORDER TO RESOLVE DIFFICULTIES

Let us start our investigation defining the concepts.

The cost of manufacture (CM), the manufacturer's gross margin excluding the manufacturer's own distribution cost (MGM), the manufacturer's own distribution cost (ODC), the wholesaler's gross margin (WGM) or the retailer's gross margin (RGM) is expressed as a percentage of the realised retail selling price respectively.

The RGM can be defined as the realised retail selling price less the cost of sales in percentage terms if the realised retail selling price is 100. The WGM can also be defined as the realised wholesale price less the cost of sales in percentage terms if the realised retail selling price is 100. The ODC can be defined as the total of wages for the sales department, the advertising cost, the physical distribution cost and subsidies given to retailer's 'sale', which will be defined in SECTION II, in percentage terms if the realised retail selling price is 100. The MGM can be defined as the selling price to wholesalers less the cost of manufacture (CM) in percentage terms if the realised retail selling price is 100. The CM can be defined as the total of the raw materials, the labour cost and expenses for manufacture including the depreciated value from machinery and equipment and expenses for power in the factory in percentage terms if the realised retail selling price is 100. We have two kinds of realised retail selling price: the traditional small retailer's selling price or the retail selling price in the S-channel and the larger outlet's selling price or the retail selling price in the L-channel, the latter of which is divided into the supermarket's selling price and the department store's selling price. The author, however, means L-channel as the channel for the supermarket and the speciality store for consumer electronics only in this paper.

Each of the RGM and WGM includes rebates given by manufacturers respectively The cost of distribution (CD) can be defined as the total of the RGM, WGM and the ODC.

$$RGM + WGM + ODC + MGM + CM = 100$$

The author tried for several months to apply the regression analysis to describe the

variation or change throughout 1986, 1996 and 2006 obtained from the personal interview surveys of the same manufacturers. It turned out, however, that the data of 2006 includes two different characters as follows: On the one hand, many of the manufacturers gave the author the data of the same characteristics as this; the data are expressed as the percentage terms of the realised retail selling price not only about 1986 and 1996, but also about 2006. On the other hand, some manufacturers could improve their MGM from the negative sign (the negative amount in money terms) in 1996 to the positive sign (the positive amount in money terms) in 2006. These manufacturers succeeded in improving on bargaining up the prices of shipment to the larger outlets. These manufacturers suppose that the larger outlets sell the commodities (items) with the lower prices than the prices which these manufacturers and the larger outlets determined the amount in money terms of MGM. The author thinks the following two things caused such a change: First, (1) there occurred fundamental changes in the industries of consumer electronics such as the digital camera, the domestic electric washing & drying machine and the TV with large-sized liquid-crystal display or plasma display. (2) each top 1 manufacturer in each industry of medium sized market faces huge-scale chain supermarkets to keep the amount in money terms positive. Secondly, the huge-scale chain-supermarkets or huge scale speciality stores of consumer electronics had already done business with 'every day low price' in 2006 although they did not do yet in 1996.

The author has decided to introduce categorical analysis using AIC (Akaike Information Criterion) in Section II.2.2 to take the two things mentioned in the last paragraph into account.

Ⅱ. REALISED GROSS MARGIN

1. Qualitative Analysis

Bureau of Statistics, Ministry of Management and Coordination, JAPAN (1979) conducted 'National Survey of Prices' every five years in such a way as 1977, 1982, 1987, 1992. The author conducted the personal interview survey of the gross margin on a company basis every ten years, 1986, 1996 and 2006. Items were selected from 1979 'Na-

tional Survey of Prices' Realised gross margins (rebates* are included into the buyer, that is to say, the wholesaler is to the manufacturer, what the retailer is to the wholesaler) are as follows: S-channel L channel

Realised retail selling price 100 100

Realised RGM (%)

Realised WGM (%)

Realised ODC (%) **

Realised MGM (%)

Realised CM (%)

* In 1986, manufacturers gave rebates to wholesalers at the end of the operating period (six months, twelve months) based on the amount of sales to wholesalers. Manufacturers also gave rebates to retailers on behalf of the wholesalers because the WGM is not enough. In contrast with 1986, in 1996 some manufacturers gave rebates when the transaction was settled because the manufacturers began to persuade wholesalers and retailers to sell the commodity items which the manufacturers wanted to extend in sales. In 2006, such a tendency was increased more and more.

Such a tendency produced, however, an important movement, which the author describes in SECTION I in such a way as 'these manufacturers succeeded in improving on bargaining up the prices of shipment to larger outlets'.

** ODC Arakawa (1969) suggested the author should investigated the ODC quantitatively. Seto thanks Gordon Wills and Keith Howard because they defined the ODC for his survey of British enterprises [Seto (1988)].

Personal interview survey in 1996

The survey was characterised by the following two points: First, the percentage of sales in the L-channel was increased rapidly between 1986 and 1996, which means that the percentage of sales in the S-channel decreased sharply as shown in Table 1 Secondly, the percentage sold at the 'sale' price, which is much lower than the staple price, was increased between 1986 and 1996 as Table 1 shows. Ueda and others (2006) also describes the same things in Table 2 and Table 3.

It will be meaningful for us to define the staple price and 'sale' price as the following manner: Staple price: The constant rate of reduction in price is applied throughout the year. 'Sale' price: Much higher rate of reduction than the staple price is applied to one week or one month. The 'sale' price is, however, applicable not to one time, but many

times a year. Table 4 will probably imply the frequency has been increased.

Table 1 Decreasing Tendency of Percentages in S-channel, Expressed as the Interval Value
(The Sum of Percentage of S-channel and L-channel Equals 100)

Items	1986	1996	2006
(1) Butter	17-22	7-12	7-12
(2) Soy sauce	42-47	32-37	27-32
(3) Edible oils	32-37	27-32	27-32

The respondent replied to the author that supermarkets which own 2-3 outlets are classified into the traditional small retailer channel (S-channel) because the number of traditional small retailers decreased in town and cities in 2006. The same manufacturer did not count the supermarkets which own 2-3 outlets into the S-channel in 1996.

(4) Margarine	7-12	7-12	7-12
(5) Mayonnaise	37-42	27-32	62-67

The respondent replied to the author that supermarkets which own 10-20 outlets and traditional small food groceries are classified into the S-channel in 2006. The same manufacturer did not count the supermarkets which own 10 -20 outlets into the S-channel in 1996.

(6) Confectionery	32-37	27-32	17-22
(7) Hams & bacons	47-52	12-17	7-12
(8) Camera:a singlelens reflex	-	57-62	7-12
(9) Camera:lens & shutter type	32-37	27-32	7-12
(10) Domestic electric washing machines	Not given	27-32	7-12
(11) Colour TV	Not given	42-47	17-22
(15) Pet food	27-32	7-12	7-12
(24) Tyres for automobiles	100	67-72	67-72

Why did the percentages of S-channel decrease rapidly between 1986 and 1996?

The author thinks Table 2 probably suggests the answer to this question.

Table 2 Changes in Trade, Marketing and Related

Month	Year	Annual sales of passenger cars excluding buses, lorries & ultra compact cars (less than 660 cc), Unit:10 thousands	Situations	
			International Domestic	Companies
Sep.,	1985		Exchange rate of yen changed based on Plaza agreement	
Mar.	1986	400		Cost reduction goes well
Oct.,	1986			Personal interview survey on gross margin conducted by the author
Mar.	1987	434		S-channel is still competi tive with L-channel*
Mar.,	1988	497	Bubble occurred	
Mar.	1989	559		
Mar	1990	598		
Dec	1990		Bubble burst	Supermarket Daiei began shrinking
Mar	1991	574		
Mar	1992	533	Competition between supermarkets to reduce prices for retail goods. S-channel lost its competitiveness with respect to pricing against L-channel	
Mar	1994	491		
Mar	1995			
Sep. & Oct.	1996		'The Quarterly Statistics of Business Enterprises (Ministry of Finance) shows turnover of capital improved on every industry of manufacture.	Personal interview survey on gross margin conducted by the author
April	1997		VAT 3% → 5%	
Sept to Nov	1997		One of top 10 banks and one of top 4 securities companies go bankrupt	
Jan.-Feb	1998		Three month pseudo-order for parts manufacturers given by Toyota begins drawing the bumpy curve**	
	1998		Serious competition between Supermarkets makes retail prices reduce more and more	
	2001		Serious recession in integrated circuit industry	
Mar.	2002		Business recovered from recession in the integrated circuit industry	
	2002			Top ownership of convenience chain store Lawson moved from chain-supermarket Daiei to Mitsubishi Corporation (Sogo shosha) . Top ownership for chain-convenience store Family Mart moved from chain-supermarket Seiyu to Itochu Corporation (Sogo shosha)
Feb.,	2006		Business recovered in many industries	
Feb., Mar. & May	2006			Personal interview survey on gross margin conducted by the author. He visited the same manufacturers as in1986 and 1996

Notes * and ** for Table 2 are described in the following two paragraphs respectively:

* In 1986, the number of manufacturers whose sales percentages in S-channel expressed as the interval value were more than or equal to 32-37 is six out of ten. Table 1 shows item numbers are as follows; (2) , (3) , (5) , (6) , (7) and (24) . In 1996, the number of manufacturers decreased to five out of thirteen. Table 1 shows item numbers are (2) , (8) , (9) , (11) and (24) .

As far as Note 2 (**) is concerned, the author did a talk on Seto (1999) .

Table 3　Sales and Rate of Reduction by 'Sale' Price, 2004

Item	Sales by 'sale' price (%)	Rate of reduction (%)
Soy sauce	55.5	16.3
Ingredient	70.5	27.7
Mayonnaise	71.1	20.1
Edible oils	73.6	27.6
Cheese	65.9	15.8
Instant curry	72.7	20.1
Food frozen after cooking	68.8	29.0
Cup noodle	68.9	17.5
Confectionery	60.3	12.5
Light confectionery	52.8	8.7
Instant coffee	82.5	25.5
Cola	61.3	9.6
Vegetable juice	64.7	10.4
Tooth paste	63.3	15.9
Domestic detergent	80.5	22.4
Shampoo	58.0	13.6

Notes: Ten outlets of a national chain-supermarket collected the data in 2004. Ueda & others (2006)

Further, consumers behave as follows: They buy a lot at 'sale' price on one occasion. They seldom buy at the staple price. Table 4 shows such a situation as described above. Table 4 shows that 77.4 percentage in physical terms sold at 158-177 yen to 198-237 yen.

Table 4　Sales in Classes of Realised Retail Selling Price

Classes by price in yen	Number of days	Percentage of the number of days sold	Percentage number of quantities sold
284	402	38.0	6.9
248-283	313	29.6	15.3
238-247	130	12.3	7.5
198-237	143	13.5	25.4
178-197	44	4.2	26.4
158-177	27	25	18.4

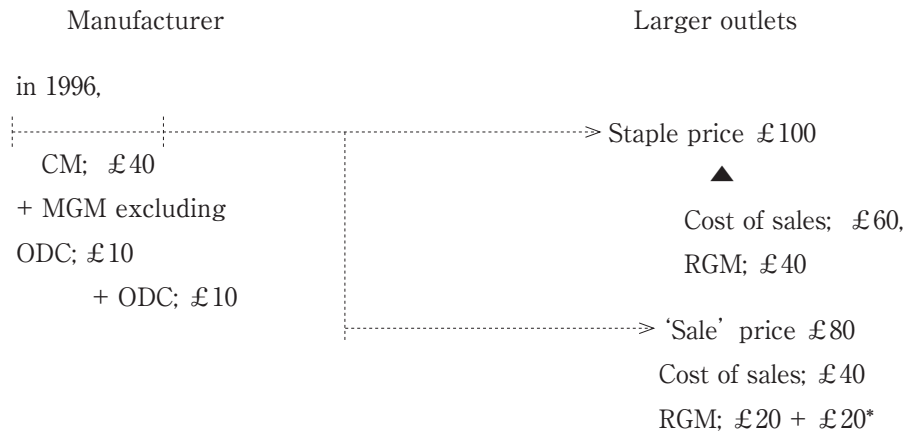
Notes: POS data collected by a national chain-supermarket
(three years between 1996 and 1999)
Ueda & others (2006)

In 2006, the author visited the same manufacturers as in 1986 and 1996 conducting the same kind of personal interview survey. The characteristics of the data of 2006 are in the following manner:

1) Despite chain supermarkets reducing the retail selling prices of many items by extending selling at 'sale' prices, chain supermarkets' gross margin of each item became nearly the same amount in money terms as the amount of the gross margin of each item received when sold at the staple price. Such a reply, was, however, not given by many manufacturers just several manufacturers. The author cannot forecast if such a situation will increase in future or not.

2) Some manufacturers' MGM excluding ODC was zero or negative in 1996. In 2006, however, these manufacturers succeeded in improving on bargaining up* the prices of shipment to the larger outlets. AIC analysis will be applied to describe this point in Section 2.2 in this SECTION.

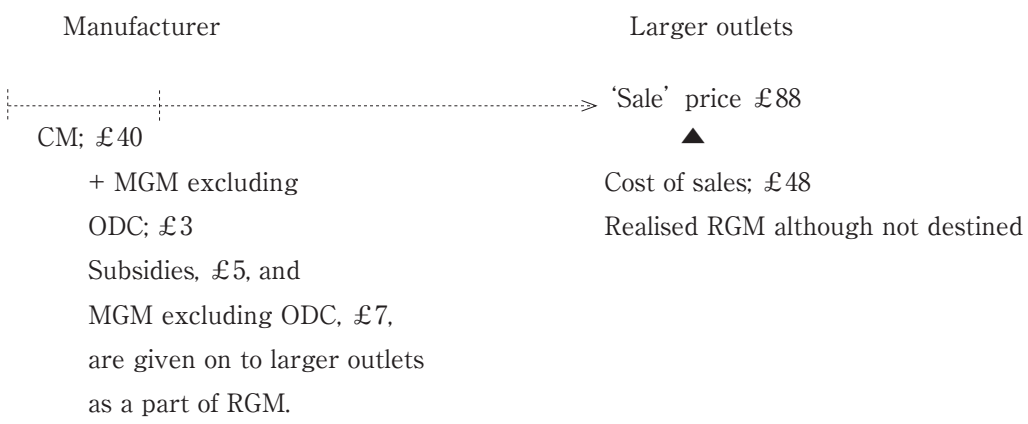
* The following is a numerical example for 'down' in 1996 and 'up' in 2006 for a manufacturer of domestic electric washing and drying machine which was not yet invented in 1996.



The amount of £10 of ODC consists of £5 of subsidies for larger outlets and £5 of wages for sales department and physical distribution cost

The sum of MGM excluding ODC and subsidies for larger outlets is £15. The sum of that £15 and the deficit, £5, of MGM is £20. That £20 is given to larger outlets, which results in a part of RGM in the above figure*.

in 2006,



The value , £48, of the cost of sales at larger outlets consists of £40 of CM , £3 of MGM excluding ODC and £5 of wages for sales department and physical distribution cost. On the other hand, The amount of £12 is given to larger outlets, which results in a part of RGM. This is one example: If consumers buy at £80 shown as in the following paragraph, the realised RGM, £32, consists of the amount of £12, which is given by the manufacturer and £20, which is shown in the numerical example of 1996.

A manufacturer and larger outlets agreed with each other that larger outlets sell consumers at £88. However, larger outlets sell, not at £88, but £80 or less than £80, which means larger outlets cannot keep the RGM, £40, but lose £8 or more than £8 out of forty pounds sterling.

2. Quantitative Analysis

2.1 Manufacturers intend to offset the CD by reducing the CM—Regression Analysis—

The following regression lines (1) [(1) and (2) are described in Chapter 5 in Seto (1992)] to (4) are already described in Seto (1998) .

The regression lines (1) to (4) express the relationship between CD (x) and CM (y), that is to say, the influence of CD on to CM. The author cannot show the data which are used to compute (1) to (4) because he should preserve the anonymity of respondents.

Item number:

1 Butter
2 Soy sauce
3 Edible oils
4 Margarine
5 Mayonnaise
6 Confectionery
7 Hams & bacons
8 Domestic detergent
9 Cameras
10 Domestic electric washing machines
11 Color TVs
12 Pharmaceuticals
13 Cosmetics
14 Domestic paint
15 Pet food
16 Underwear for men and children
17 Lingerie—one brand manufacturer
18 Sweaters for women
19 Jackets for men
20 Walking shoes for men
21 Crockery
22 Lingerie—another manufacturer
23 Hosiery
24 Tyres for automobiles
25 Motor scooters

S-channel in 1986

y: MGM, x: CD

Number of items:19 , edible oils are excluded

y = 91.88082 - 1.00881x (1)

(16.57) (-10.14)

The values 16.57 and - 10.14 are t-values

correlation coefficient between x and y: - 0.92, coefficient of determination adjusted for the degrees of freedom: 0.84, standard errors: 5.09

Items: 1, 2, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 25

The reader will be able to see the one to one relationship between each item and each number of item in [Figure 5-1, chapter 5 in Seto (1992)] .

L-channel in 1986

y: MGM, x: CD

Number of items:17

y = 83.13177 - 0.85003x (2)

(15.26) (-8.92)

correlation coefficient between x and y:-0.92 , coefficient of determination adjusted for the degrees of freedom: 0.83, standard errors: 5.29

Items: 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19

The reader will be able to see the one to one relationship between each item and each number of item in [Figure 5-2, chapter 5 in Seto (1992)] .

S-channel in 1996

y: MGM, x: CD

Number of items:18

y = 82.40991 - 0.81750x (3)

(11.75) (-6.04)

correlation coefficient between x and y: - 0.83, coefficient of determination adjusted for the degrees of freedom: 0.68, standard errors: 5.61

Items: 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 15, 16, 19, 20, 24, 25

L-channel in 1996

y: MGM, x: CD

Number of items:14

$$y = 80.00134 - 0.70495x \qquad (4)$$

(10.12) (-5.00)

correlation coefficient between x and y: - 0.92, coefficient of determination adjusted for the degrees of freedom: 0.83, standard errors: 5.29

Items: 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 15, 16, 24

The author would like to explain by estimating the relationship between the CD and CM. Regression line (1) shows that the MGM which is defined as 100 less (the CD + the CM) is constant in the S-channel where the CM, CD, ODC or RGM is expressed as a percentage of the realised retail selling price.

This is a remarkable fact obtained from his survey. However, as the reader will notice, this finding is based on the cross sectional data. Can we state that the CM will decrease by one unit if the CD increases by one unit in consumer goods such as domestic electric washing machines, cosmetics, women's lingerie or butter? What we definitely state is that the MGM is invariant throughout the consumer goods industries quoted above at one time of the time serial flow. This, of course, does not mean the MGM is constant at any time of the flow.

The regression line (2) using seventeen points shows that the MGM is not constant, but decreases as the CD increases in the L-channel.

The reason why the MGM decreases as the CD increases is that the CM cannot be reduced enough to recover the constant MGM when the CD increases.

Apart from the discussion described above, we have the number of data of 2006 which is less than the regression lines (1) to (4) . Table 2 suggests we should bear in mind it was a hard ten year period from 1996 to 2006 for Japanese manufacturers. One

manufacturer of cosmetics, which was kind enough to have accepted the author in 1986 and 1996, was taken over by a domestic detergent manufacturer, which decided to extend its business to cosmetics and edible oils, and one brand manufacturer of apparel - lingerie, sweaters for women, underwear for men and children and jackets for men - , which also had accepted him in 1986 and 1996, shrank because of a huge deficit. Both of them could not accept him in 2006. The author decided to reduce the number of items of 1986 and 1996 in order to compare the result of computations for 1986, 1996 and 2006.

S-channel, 1986

y: MGM, x: CD

Number of items:10

$$y = 79.501553 - 0.7761267x \qquad (5)$$

(11.24) (-5.49602)

correlation coefficient between x and y: - 0.89, coefficient of determination adjusted for the degrees of freedom: 0.76, standard errors: 4.89

Items: 1, 2, 3, 4, 5, 6, 7, 9, 14, 15

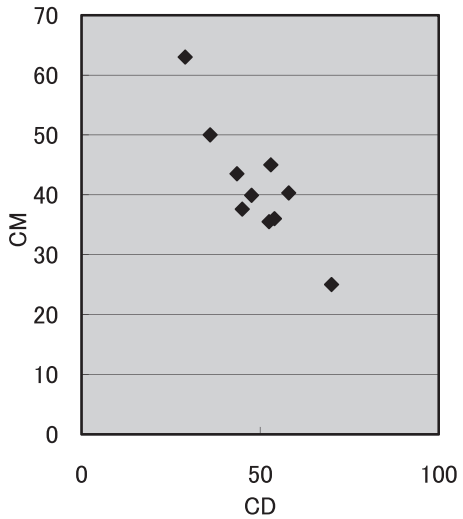


Figure 1 1986S_channel

L - channel, 1986

y = MGM, x: CD

Number of items:10

y= 80.773525 - 0.8117409x (6)

(8.61) (-4.3961)

correlation coefficient between x and y: - 0.84, coefficient of determination adjusted for the degrees of freedom: 0.6, 7 standard errors: 6.23

Items: 1, 2, 3, 4, 5, 6, 7, 9, 14, 15

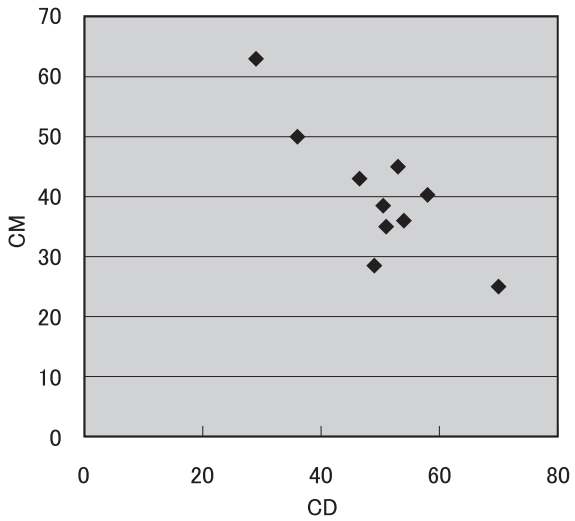


Figure 2 1986L_channel

S - channel, 1996

y = MGM, x: CD

Number of items:12

y = 66.12255 -0.53018x (7)

(4.452) (-1.75)

correlation coefficient between x and y: - 0.48, coefficient of determination adjusted for the degrees of freedom: 0.16, standard errors: 7.62

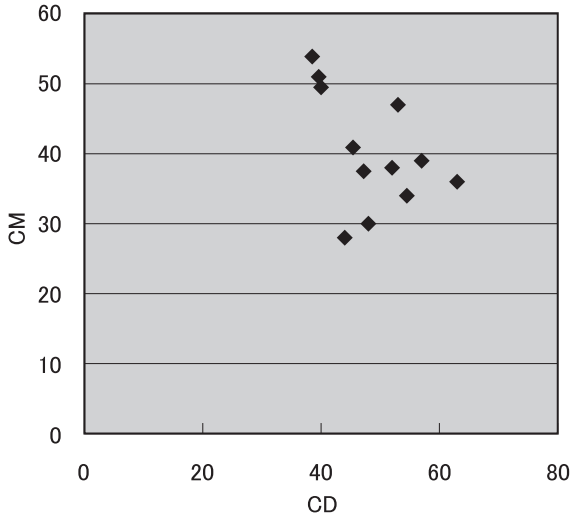


Figure 3 1996S_channel

L - channel, 1996

y = MGM, x: CD

Number of items:12

y = 79.05476 - 0.718518x (8)

(4.09) (-1.93)

correlation coefficient between x and y: - 0.52, coefficient of determination adjusted for the degrees of freedom: 0.20, standard errors: 8.66

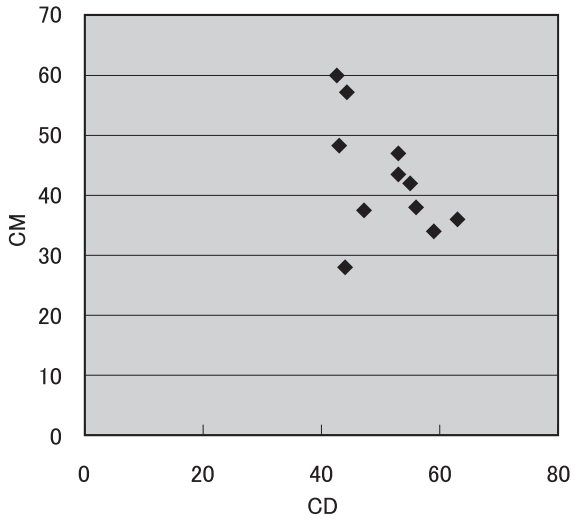


Figure 4 1996L_channel

S - channel, 2006

y = MGM, x: CD

Number of items:12

y = 59.37530 - 0.38287x (9)

(5.38) (-1.75)

correlation coefficient between x and y: - 0.48, coefficient of determination adjusted for the degrees of freedom: 0.16, standard errors: 6.00

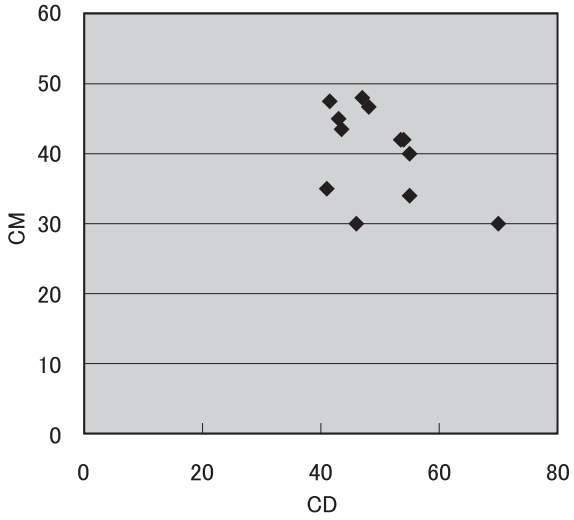


Figure 5 2006S_channel

L - channel, 2006

y = MGM, x: CD

Number of items:14

y = 50.922371 - 0.2140334x (10)

(3.73) (-0.80)

correlation coefficient between x and y: - 0.23, coefficient of determination adjusted for the degrees of freedom: -0.03, standard errors: 6.25

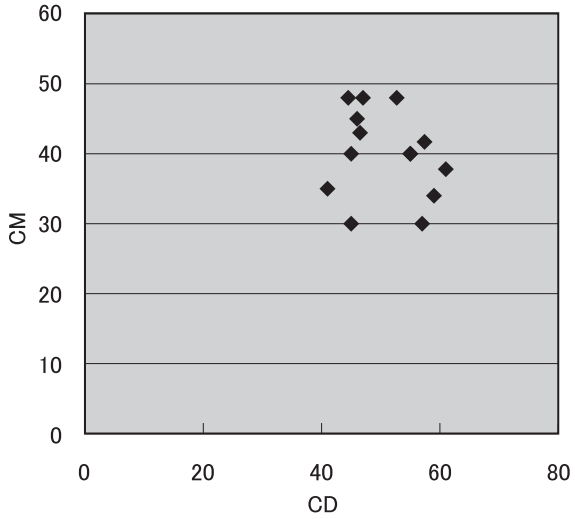


Figure 6 2006L_channel

Explanatory variable : Cost of Distribution (CD)

	S-channel			L-channel		
	Coefficient of CD	t-value 0f CD	CODAFDF*	Coefficient of CD	t-value of CD	CODAFDF*
1986	- 0.77613	-5.50	0.76	- 0.81174	-5.00	0.67
1996	- 0.53018	-1.75	0.16	- 0.71852	-1.93	0.20
2006	- 0.38287	-1.75	0.16	- 0.21403	-0.80	-0.03

* coefficient of determination adjusted for the degrees of freedom is abridged to CODAFDF

The regression line (5) to the regression line (10) show each of the absolute value of the regression coefficient of x (CD), t-value and the coefficient of determination adjusted for the degrees of freedom has a descending tendency through 1986, 1996 and 2006. If the reader looks at Table 2, he will find that the S-channel (the traditional small retailer channel) was still competitive with the L-channel (the larger outlet channel) in 1986. The S-channel, however, lost its competitiveness with the L-channel at the end of 1990, when the bubble burst.

The regression lines (9) and (10) show that the relationship of x and y, which ex-

isted 1n 1986, was lost in 2006. The manufacturers could not reduce the CM (cost of manufacture) in 2006 offsetting the increasing CD.

2.2 Categorisation of data in order to use AIC

In the last paragraph in the above section, the author shows that the regression analysis is not able to grasp the relationship between the CD and the CM on the basis of the data in 2006. The data of 2006 suggests we should investigate the following point: the transaction between the manufacturer and the chain supermarket or the speciality store of consumer electronics has two different characters.

2.2.1 Result of the survey

2.2.1.1 Dependent variable and explanatory variables

Sakamoto & others (1983, p. 84) describes as follows: It is the difference of AIC values that matters and not the actual values themselves. This is because of the fact that AIC (k) is an estimate of the mean expected log likelihood of a model and is not an estimate of the Kullback-Leibler information quantity. I (g (・) ; f (・|θ_{κ})) . From the relation between AIC and the entropy, if the diffference of AIC's for MODEL (j) and MODEL (κ) is larger than 1-2, then the difference is considered to be significant. If

$$|\mathrm{AIC}(\mathrm{j}) - \mathrm{AIC}(\kappa)| < 1,$$

then the goodness of the fits of these models are almost the same. For example, if

AIC (j) = 1981816.15
AIC (κ) = 1981819.84

then MODEL (j) is considered to be better than MODEL (κ).

On the other hand, if

AIC (j) = 0.0001
AIC (κ) = 0.1000

then the goodness of fits of both models are much the same. It is possible that, even if

AIC's of two models are nearly equal, the distribution expressed by models are quite different. In that case it is reasonable to consider that neither of the models is good.

Sakamoto & others (1983, p. 84) describes it as follows: It is the difference of AIC values that matters and not the actual values themselves. This is because AIC (k) is an estimate of the mean expected log likelihood of a model and is not an estimate of the Kullback-Leibler information quantity.

S < L: Let us call S < L as original category 1. On the one hand, the realised retail selling price in the L-channel is lower and on the other hand, the CM in money terms in the L-channel is reduced (because the physical volume placed as an order from the chain supermarket or the speciality store of consumer electronics is much larger). If the realised retail selling price is reduced more than the rate of reduction in the CM, S < L. Furthermore, if the CM in both channels is the same in money terms, S < L because the realised retail selling price in the L-channel is lower.

S = L: Let us call S = L as original category 2. When we describe S = L concerning the CM, there are two possibilities. One is that the two are the same in money terms. Another is the case that the CM in the L-channel is lower, but the realised retail selling price in the L-channel is also lower.

The lower CM divided by the lower realised retail selling price in the L-channel = a.

The larger CM divided by the lower realised retail selling price in the S-channel = b. If a = b, the result is S = L.

Going on to 1996 and 2006, we have some items where S = L in connection not only with the CM, but also with the MGM and, furthermore, with the CD in both channels. The author thinks that the S-channel might have been negligible for the respondents because Table 1 shows the decreasing tendency of percentages in the S-channel through 1986, 1996 and 2006.

Table 1 shows that one item, mayonnaise, was in the following situation in 2006. A manufacturer replied to the author that the manufacturer changed the classification to the following manner concerning 2006; supermarkets which owned twenty or less than

twenty outlets were moved from the L-channel to the S-channel in 2006. As a result, the percentage of the L-channel was reduced to less than 50 in 2006 while it was 68-73 in 1996.

Table 1 also shows another item, edible oils, was in the following situation in 2006. A manufacturer replied that the manufacturer moved the classification as follows; supermarkets which owned 2-3 outlets were moved from the L-channel to the S-channel in 2006. As a result, the percentage of the L-channel was 68-73 not only in 1996 but also in 2006 while the percentages of other items in the L-channel were quite a bit higher than 68-73 in 2006. As far as the CM is concerned , S = L although the author cannot write the numerical value because he has to obey the agreement between the respondent and the author. As far as the CD is concerned, S < L, which results in S > L in relation with the MGM.

As far as transportation and related is concerned, the CM, the CD and MGM are equal to each other in both channels. Further, the percentage in the S-channel was still higher in 2006. The author would like to note that the item , which belongs to the ' transportation and related ', is not the assembly manufacturer here, but parts which are equipped to cars.

S > L: Let us call S > L as original category 3. If the rate of reduction in the CM in money terms is larger than the rate of reduction in the realized retail selling price in the L-channel, S > L. When the author visited manufacturers to conduct the survey of personal interviews, he realised that the following thing is important. The author describes in SECTION I. that the data of 2006 include two different characteristics. On the one hand, many of the manufacturers gave the author the data of the same characteristics as follows; the data are expressed as percentage terms of the realised retail selling price not only about 1986 and 1996, but also about 2006. On the other hand, three manufacturers were able to improve their MGMs from the negative (the negative amount in money terms) in 1996 to the positive (the positive amount in money terms) in 2006. These three manufacturers succeeded in improving on bargaining up the price of shipment to the larger outlet. These three manufacturers suppose that the larger outlets

sell the commodities (items) at lower prices than the prices which these manufacturers and the larger outlets agreed on when they decided the amount in money terms of MGM. In 1996, the MGMs of these manufacturers were 11th, which means the bottom, 10th and 9th of all eleven items. The CMs of these three items are S < L. That means the original category was 1 in 1996. It changed, however, to S > L in 2006, which means the original category is 3 in 2006. The MGM of the fourth item was ranked second, which means the MGM of the fourth item is large. On the one hand, in the industry which the item mentioned above belonged to, Japanese manufacturers depend largely upon the import of beans from the USA and Australia from the point of view of the CM. On the other hand, many manufacturers using the item mentioned above compete with each other in the domestic market. As far as the CM and the MGM are concerned, the CM (not in percentage terms, but money terms) was reduced more than the reduction in money terms of the realized retail selling price in 1996. In 1996, all respondents of 11 manufacturers replied that they gave subsidies to retailers for the manufacturers ' 'sale' products. We are, therefore, able to compare each manufacturer's ODC using the data of 1996. The reader will be able to see Table 5 and Table 6 based on the paragraphs mentioned above.

Table 5 The Cost of Manufacture —Changes occurring between 1986 and 1996—

Original Category 86	96	Recoded to	Number of Items
1	1		nothing
1	2	4	2 Processed food 1, Domestic machine 1
1	3	1	2 Processed food 2
2	1	3	3 Processed food 2 Cosmetics 1
2	2	2	2 Processed food 1, Domestic machine
2	3		nothing
3	1	3	1 Processed food 1
3	2	4	1 Processed food 1
3	3		nothing

Notes:
Food (domestic products) : Butter, Soy sauce, Edible oils, Margarine, Mayonnaise, Confectionery, Hams & Bacons, Pet food
Domestic machines (domestic products) : Anonymous
The author has to confess that two manufacturers of cameras gave him their data. He put these two data into different categories, which leads to different recodes.

Table 6 The Cost of Manufacture －Changes occurred between 1996 and 2006－

Original Category 96	06	Recoded to	Number of Items
1	1	4	3 Processed food 2, Consumer electronics B
1	2		nothing
1	3	1	2 Processed food 1, Consumer electronics A
2	1		nothing
2	2	2	4 Processed food 3, Transportation machinery & related 1
2	3		nothing
3	1	3	1 Processed food 1
3	2		nothing
3	3	4	1 Processed food 1

Notes:
Food and related (domestic products) Butter, Soy sauce, Edible oils,
Margarine, Mayonnaise, Confectionery, Hams & Bacons, Pet food,
Consumer electronics (domestic products) , Camera, Consumer electronics A,
Consumer electronics B
Transportation machinery & related ,Anonymous because of only one item

Comparing 1996 Survey with 1986 Survey:

As far as the 1996 survey is concerned, the CM in the L-channel must be lower than the one in the S-channel because , as Table 2 shows, in 1992 after the bubble burst, supermarkets had to compete not only with traditional small retailers, but with supermarkets to reduce retail selling prices for consumer goods.

We should look at the original category 1 only when we deal with the data of 1996. In contrast with this, we should take it into account that original category 1, original category 2 and original category 3 of the data of 1986 could stream into the category 1 of 1996.

The author owes Sakamoto (1985) using CATDAP-2 programme [Katsura, K. & Sakamoto, Y. (1980)] to conduct the model analysis of categorical data.

Table 7_1 Explanatory variable influencing on changes which occurred in the CM between 1986 and 1996

	Explanatory variables	AIC	difference between two AICs
1.	MGM_L86	2.59	0.00
2.	Percentage of shipment to L-channel in 1996	2.77	0.17
3.	CD_L96	4.74	1.97

Before computing, the author forecast that the percentage of the L-channel in 1996 would be ranked first. The result of computation, however, shows that MGM_L86, which means the manufacturer's gross margin of the L-channel in 1986, is ranked first. The difference, however, between MGM_L86 and the percentage of the L-channel in 1996 is 0.17, which means that the difference is not significant.

As far as the number of combinations is concerned, we have seven, namely:

(1) the MGM_L86, which means the percentage of the manufacturer's gross margin, which excludes the ODC in the larger outlet channel, in 1986; (2) the percentage of shipments to the L-channel in 1996, which means the percentage of shipments to the larger outlet channel in 1996) ; (3) the CD_L96; (4) the MGM_L86 & the percentage to the L-channel; (5) the MGM_L86 & the CD_L96; (6) the percentage of the shipment to the L-channel in 1996l & the CD_L96, and (7) the MGM_L86 & the percentage of the shipment to the L-channel & the CD_L96. Why in the top three of the seven combinations are the single explanatory variable respectively?. The reason is that the number of the data is eleven, which is not large in number.

Table 7-1 and Table 7-2 show explanatory variable MGM_L86 will most well be able to explain changes in the CM occurring between 1986 and 1996. The recoded category expresses those changes. The author is interested in recoded categories 1 and 3 because recoded category 2 means 'unchanging' between 1986 and 1996. Table 7-2 shows two items are classified to recoded category 1 and four items are classified to recoded

Table 7_2 Explanatory variable influencing on changes which occurred in the CM between 1986 and 1996, in detail

First						Second					
Dependent variable						Dependent variable					
Changes occurring in CM between 1986 and 1996						Changes occurring in CM between 1986 and 1996					
Explanatory variable FMGM_L86						Explanatory variable: Percentage of Shipment to L_channel in 1996					
Recoded Ca.	1	2	3	4	Total	Recoded Ca,	1	2	3	4	Total
Optimal pooling for explanatory variable						Optimal pooling for explanatory variable					
1.7- 7.5	0	2	2	0	4	45.0-80.5	0	1	3	3	7
7.5-20.0	2	0	2	3	7	80.5-92.0	2	1	1	0	4
Total	2	2	4	3	11	Total	2	2	4	3	11

Note: 'Recoded Ca.' means the recoded category of the dependent variable

category 3. The number of six (two added to four) of eleven is not necessarily enough. As far as the optimal pooling is concerned, Katsura and Sakamoto (1980) programmes to automatically select the optimal pooling. The two items recoded to category 1 belong to '7.5 - 20.0' whereas two of four items which are classified to category 3 belong to '1.7 - 7.5' and the residual two items belong to '7.5 - 20.0', which means the MGM_L86 cannot explain the behavior (the change) of recoded category 3. 'The percentage of the shipment to the L-channel in 1996' is ranked second.

The optimal pooling is less than 80.5, and more than 80.5. The two items recoded to category 1 belong to '80.5 - 92.0'. The author thinks, however, that recoded category 3 is characteristic of a direction of change between 1986 and 1996.Three of four items classified into recoded category 3 belong to '45.0 - 80.5'. The recoded category 3 means that the CM expressed as a percentage of the realised retail selling price in the L-channel is above the CM expressed as a percentage of the realised retail selling price in the S-channel. The reader will probably wonder if the percentage of the shipment to the L-channel in 1996 is more effective than MGM_L86. As far as recoded category 2 is concerned, however, MGM_L86 can explain more than the percentage of the shipment to the L-channel in 1996 because the percentage of the shipment to the L-channel in 1996

can explain nothing (recoded category 2 is scattered one and one) whereas two items belong to '1.7 - 7.5' if we look at MGM_L86.

However, the difference between the MGM_L86 and the percentage of the shipment to the L-channel in 1996 is 0.17, which means the difference is not significant.

2.2.2 Discussion

What the author described in Section 2.2.1 is the result which can easily be derived from the survey. We must, however, face a complicated problem to be resolved carefully. The data of 2006 has two characteristics.

Table 8-2 shows the explanatory variable influencing on changes which occurred in the CM between 1996 and 2006 in two different ways. The problem is concerned with consumer electronics and processed food.

Table 8_1 Explanatory variable influencing on changes which occurred in the CM between 1996 and 2006

1.	MGM_L96	1.81	0.00
2.	CD_L06	2.92	1.10
3.	Percentage of shipment to L-channel in 2006	3.82	0.91

Table 8_2 Explanatory variable influencing on changes which occurred in the CM between 1996 and 2006, in detail

First
Dependent variable
Changes occurring in CM between 1996 and 2006
Explanatory variable: MGM_L96

Recoded Ca.	1	2	3	4	Total
Optimal pooling for explanatory variable					
	1	2	3	4	Total
-2.9- 0.0	3	0	0	0	3
0.0- 28.0	1	3	1	3	8
Total	4	3	1	3	11

Second
Dependent variable
Changes occurring in CM between 1996 and 2006
Explanatory variable: CD_L06

Recoded Ca,	1	2	3	4	Total
Optimal pooling for explanatory variable					
	1	2	3	4	Total
41.0- 57.5	4	3	1	1	9
57.5- 61.0	0	0	0	2	2
Total	4	3	1	3	11

Note: 'Recoded Ca.' means the recoded category of the dependent variable

There are two items: one item of consumer electronics (Item A) and one item of processed food. As far as these two items are concerned, the CM was S < L in 1996, but changed to S > L in 2006. The author would, however, like to get Table 8_1 and Table 8_2 classifying, not two, but four items adding another item (Item B) one item of consumer electronics and another item of processed food into recoded category 1.

Concerning consumer electronics, Item A changes from original category 1 (1996) to original category 3 (2006) whereas item B is still unchanged as follows; original category 1 (1996) to original category 1 (2006). In Table 8_1 and Table 8_2. However, item B is changed in such a way as 'original category 1 (1996) ¨ original category 3 (2006)'. One item of processed food changes from original category 1 (1996) to original category 3 (2006).We do not find any problem in relation to that item.

As far as another processed food is concerned, the author has to describe this in detail. The manufacturer which produces the processed food gave the author the data of the CM in money terms, so ODC in money terms is added to the CM in 2006. That ODC includes the difference between the staple price less the price reduction in retailers. The manufacturer's shipment is done at the CM added to by the MGM. The ODC contains a. subsidies given to retailers to persuade them to sell at the 'sale' price (as far as that processed food is concerned, the physical volume of 75-85 in percentage is sold at 'sale' price), b. wage and expenses in the sales department, c. expenses for advertising and d. the cost of physical distribution. Retailers in the S-channel, which includes the traditional small retailer channel and supermarkets which own about twenty or less than twenty outlets, and retailers in the L-channel buy the manufacturer's item mentioned above at the same price as retailers in the S-channel. The retailers which deal with that item determined the selling price on their own in 2006. The reader might suppose the realised retail selling price in the S-channel is higher than the one in the L-channel. That is, however, not the fact, which leads to S > L. S > L is original category 3. S > L is thus recoded to 1 in this paper.

Three of four manufacturers mentioned above aimed at the following direction between 1996 and 2006. These three manufacturers' MGMs (manufacturer's gross margin excluding the ODC) were negative or zero in 1996. These three manufacturers were

able to improve their MGM from the negative (the negative amount in money terms) recorded in 1996 to the positive (the positive amount in money terms) in 2006. These three manufacturers succeeded in improving on bargaining up the price of shipment to the larger outlets. These three manufacturers suppose that the larger outlets sell the commodities (items) at lower prices than the prices which these manufacturers and the larger outlets agreed on when they decided the amount in money terms of MGM in 2006. In 1996, the MGMs of these manufacturers were 11th, 10th and 9th of all eleven items.

The MGM of the fourth item was ranked second which means the MGM of the fourth item is large. On the one hand, in the industry which the item mentioned above belonged to, Japanese manufacturers depend largely upon the import from the USA and Australia from the point of view of the CM. On the other hand, many manufacturers using the item mentioned above compete with each other in the domestic market. As far as the CM and the MGM are concerned, the CM (not percentage terms, but money terms) was reduced more than the reduction in money terms of the realised retail selling price in 1996. The reader will probably have grasped what the author describes at the beginning of this Discussion Section. We will be able to resolve the complicated problem in the following manner. As far as the original category is concerned, item A of consumer electronics is 1 (1996) → 3 (2006) whereas item B of consumer electronics is 1 (1996) → 1 (2006). Where is such a difference derived from? Item A was top in the domestic market in 2005 and 2006. Item B was, however, not within the top three manufacturers in the domestic market in the same years. The author thinks, however, that. Item B would be classified into 1 (1996) → 3 (2006) if the item B were top in the domestic market. Although the MGM of item B was still negative in 2006, the degree of improvement in value was as much as the MGM, which was also negative in 1996, of item A. This is the reason why the author classified item B as 1 (1996) → 3 (2006).

Table 10　The Cost of Manufacture - Changes between 1996 and 2006

Before changing:*

Original Category 96	06	Recoded to	Number of Items
1	1	4	3　Processed food 2, Consumer electronics B
1	2		nothing
1	3	1	2　Processed food 1, Consumer electronics A
2	1		nothing
2	2	2	4　Processed food 3, Transportation machinery & related 1
2	3		nothing
3	1	3	1　Processed food 1
3	2		nothing
3	3	4	1　Processed food 1

* The same as Table 6

After changing:

Original Category 96	06	Recoded to	Number of Items
1	1	4	2　Processed food 2
1	2		nothing
1	3	1	4　Processed food 2, Consumer electronics A, Consumer electronics B,
2	1		nothing
2	2	2	3　Processed food 2, Transportation machinery & related 1
2	3		nothing
3	1	3	1　Processed food 1
3	2		nothing
3	3	4	1　Processed food 1

Dependent variable. As the reader already knows, the dependent variable is changes of the cost of manufacture occurring between 1996 and 2006 in this Discussion Section. If we look at the CM from the point of view not of percentage terms but of money terms, the CM in the L-channel would be smaller than the CM in the S-channel. As far as the CM for the products to be sent to the speciality stores is concerned, the assembly manufacturer in the consumer electronics industry will be able to reduce the CM fulfilling slight vacancies in scheduling at the factory with the order placed by the speciality

stores of consumer electronics. Although such a thing as mentioned just now is applicable for 1986 and 1996, it is not suitable for 2006 because Table 1 shows the percentages of both of consumer electronics in the S-channel sharply decreased to 7-12 in 2006. The manufacturer will not be able to reduce the CM in the L-channel because almost the whole day is already used for the L-channel in 2006. In order to reduce the CM in the L-channel, the manufacturer has to span a supply chain with the speciality stores of consumer electronics.

The manufacturer strikes a bargain over the shipment for one year with the speciality stores of consumer electronics.

From Ordering to Actual Production

In week N-2, the Japanese Japan-based domestic electric washing machine manufacturer provides specifications and quantities, which are based on the order given from the speciality stores of consumer electronics, to Tier 1 to deliver on each workday in week N. The American top three and Japanese North America-based automotive manufacturers give the same lead time as this. (Seto and Honda [2001]) .

Table 7-2 shows the optimal point of pooling is 7.5 in relation to MGM_L86, whereas, Table 8-2 shows the optimal point of pooling is 0.0 in relation to MGM_L96, where three out of four items belong. This means that these three manufacturers could not incur the negative value of MGM_L96. On the other hand, not in 1996 but in 2006, the speciality stores of consumer electronics and one of the Japanese big chain supermarket adopted ' every day low price selling'. The author thinks these two occurrences let S > L (2006) result.

Ⅲ CONCLUSION

The analysis of the data using AIC shows the following conclusion. First, concerning changes in the CM occurring between 1986 and 1996, each of the MGM_L86 and the percentage of the L-channel in 1996 is useful. Secondly, concerning changes in the CM occurring between 1996 and 2006, the MGM_L96 is useful.

In 1986, some manufacturers could offset the deficit or the low MGM with the MGM_S86, which is the MGM in the S-channel, because the amount of the MGM_S86 in money terms was quite a bit larger than the amount of the MGM_L86. In 1996, all manufacturers surveyed by the author had to give subsidies to retailers in the L-channel to persuade them to sell at 'sale' price.

The average percentage of the shipment of all eleven manufacturers to larger outlets in 1986 was 54.5 whereas the shipment had risen to 72.8 in 1996. Such an increased percentage reduced the sum of the MGMs in both channels.

The average percentage of the shipment of all eleven manufacturers to larger outlets which was 54.5 in 1986 rose to 72.8 between 1986 and 1996 and 78.4 between 1996 and 2006. In contrast to this, the shipment to traditional small retailers decreased to (100-54.5) in 1986, (100-72.8) in 1996 and (100-78.4) in 2006. Some manufacturers could not keep the positive MGM not only in money terms, but also in percentage terms in 1996. Table 8-2 shows the optimal point of pooling is 0.0 in relation to MGM_L96, where three out of four items belong to 0.0 or less than 0.0. This means that these three manufacturers could not incur the negative value of MGM_L96. On the other hand, not in 1996 but in 2006, the speciality stores of consumer electronics and one of the Japanese big chain supermarket adopted 'every day low price selling'. The author thinks these two occurrences let S > L (2006) result. The author cannot convince himself, however, if the situation which occurred in 2006, extends to (a) other items than item A and item B in the consumer electronics industry, and (b) other manufacturers in the same industry, that is, the food processing industry. The author will, however, be able to state only two things in the following manner. As far as (a) is concerned, the author thinks the S > L (2006) has already extended to a manufacturer who manufactures an item that belongs to the consumer electronics industry. On the contrary, the S > L (2006) movement might have derived from that manufacturer and extended to the consumer electronics industry. As far as 'other manufacturers in the food processing industry' are concerned, the author is interested in a food processing manufacturer, which is top in a medium sized domestic market and endeavours to keep the positive MGM with its own label even if the chain supermarket asks for OEM supply.

REFERENCES

Arakawa, Y., (1969) Trade Structure and Rationalisation in Distribution . Chikura Publishing Co., Tokyo (in Japanese)

Katsura, K., Sakamoto, Y., (1980) CATDAP, A Categorical Data Analysis Program Package, Computer Science Monograph, No.14, The Institute of Statistical Mathematics.Tokyo, pp.1-73

Sakamoto, Y. (1985) , Model Analysis of Categorical Data, Kyoritsu Publishing Co. (in Japanese)

Sakamoto, Y., Ishiguro, M., Kitagawa, G., (1986) , Akaike Information Criterion Statistics, D. Reidel, Dordrecht, Holland.

Seto, H., (1991) , Foundations of Manufacturer's Sales Subsidiary Distribution, Chikura Publishing Co, Tokyo. (in Japanese)

Seto (1992) Japanese Production and Distribution in Synchronization - a Statistical Investigation. Shinzansha Publishing Co. Tokyo.

Ministry of Finance (1996) , Quarterly Statistics of Business Enterprises. (in Japanese)

Seto, H., (1998) , The Cost of Manufacture and the Cost of Distribution in the Traditional Small Retailer Channel Compared with the Supermarket Channel, Small Business Quarterly Journal, No.2, 1998, Institute of Small Business Research and Business Administration, Osaka University of Economics, pp.9-16, (in Japanese)

Seto, H., (1999) Japanese Manufacturers' Sales Subsidiary System Influencing on Upstream Manufacture, Proceedings of the 15th Annual IMP (Industrial Marketing and Purchasing) Conference, hosted by University College Dublin, Dublin, Ireland, Number of pages 14 (CD-ROM)

Seto, H., Honda, M., (2001) Information Structure of Buyer-Seller Relationship in the Automotive Industry and Consumer Electronics Industry, Proceedings of the 17th Annual IMP (Industrial Marketing and Purchasing) Conference, hosted by Norwegian School of Management BI, Oslo, Norway, Number of pages 8 (CD-ROM) .

Statistics of Bureau, Ministry of Management and Coordination, (1979) , National Survey of Prices, Tokyo. (in Japanese accompanied by English)

Ueda, T., Moriguchi T., Okuse, Y., Dazai, U., Kumakura, H. (2006) , Special Session, Journal of Marketing & Distribution, Published by Japan Society of Marketing and Distribution, pp.33-60 (in Japanese)

研　究　紀　要
第52・53合併号
平成22年２月25日　印刷
平成22年２月28日　発行

編集発行　高　松　大　学
高 松 短 期 大 学
〒761-0194　高松市春日町960番地
TEL（087）841－3255
FAX（087）841－3064

印　刷　株式会社　美巧社
高松市多賀町１－８－10
TEL（087）833－5811