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Abstract

Japan is a diverse country. From the wide open spaces of the northern island of Hokkaido, to the crowded metropolises of the Kanto plains, to the fishing villages in the southern island of Kyushu, Japan presents a rich tapestry of often quite distinct and different life-styles and traditions. These differences are reflected in differing food consumption patterns across many parts of the country. Japanese food consumption has been a popular topic of research, particularly by analysts in those countries hoping to capture a larger share of Japan's increasingly open agricultural markets. However, variations in food consumption between different parts of Japan have been overlooked in the past, at least by Western researchers. The purpose of this paper is to contribute to the understanding of Japanese food consumption by investigating regional variations in per person food consumption. This will help show whether regional differences in food consumption still exist. The data set is taken from *Kokumin Eiyo Chosa* [National Nutrition Survey], published by the Ministry of Health and Welfare, which utilises information from approximately 6,000 households annually. The study period runs from 1974 to 1992. The results of the analysis suggest that per person consumption of beef, pork, poultry, processed meats, fish, beer and vegetables is tending to converge and that consumption patterns are in general less variable across regions than they were in the past.

Regional Variations in Diets in Japan

Introduction

It is common practice for Japanese tourists and businesspeople to purchase food items as souvenirs in the towns or regions that they visit. Gifts of food are also popular in the two gift-giving seasons: *Chugen* (mid year) and *Seibo* (year end). Often the food given as a gift comes from a particular locality in Japan: melons from Shizuoka and Aichi prefectures, dairy products from Hokkaido and Dutch-style cakes from the city of Nagasaki are a few examples. Japanese television shows many hours of programs that focus on foods from different parts of Japan. The reason for this interest in food is that even though in almost all parts of Japan the core of the Japanese diet is composed of rice, vegetables and fish, different parts of the country have often quite distinctive regional cuisines. These differences reflect variations in climate and topography, historical and cultural factors, government policies, variations in regional economic performance and the availability of agricultural land.

Variations in diet within Japan have so far been little investigated by foreign researchers with an interest in Japan's food requirements. The issue is important because with reductions in trade barriers to Japan's food market, opportunities will continue to expand in that market.[1] However, exporting firms will not be able to realise the full potential of the market without an understanding of the degree to which dietary patterns vary within Japan. Most published analyses of Japan's food market have not taken explicit account of regional differences. Of course, regional variations in diet are not just a potential barrier to foreign firms. Accessing the Hokkaido market may be just as big a barrier to a food manufacturer in Kyushu as it is for a firm in Australia.

In the 1950s and 1960s Japan experienced massive migration from rural to urban areas as young people left rural villages and towns to work in the factories of Tokyo–Yokohama, Osaka–Kobe and other industrial cities. These young people took with them knowledge of their own region's food culture. Since 1960, when Prime Minister Ikeda set Japan's workers the goal of doubling their incomes within ten years, income levels in Japan have grown at a rapid pace. This income growth has been accompanied by developments in transportation technologies that have allowed for the rapid movement of commodities from one part of Japan to another. High-speed trains and trucks mean that the food arrives at its destination in good condition, even though it may be many kilometres from the producing region. Needless to say, massive flows

of information and goods and services have taken place in other directions as well, due to dramatic developments in mass media across the nation.

One might expect that such developments would tend to reduce regional variations in diet. To shed light on this issue, this paper first documents the extent of regional differences in food consumption. It then investigates whether regional differences in food consumption are becoming more or less marked. The findings of this paper should be of value to food-exporting companies, since different marketing strategies may be needed in different parts of Japan if it can be shown that regional differences in diets still exist.

Data source

Most of the data used in this paper come from *Kokumin Eiyo Chosa* [National Nutrition Survey], a cross-sectional survey conducted annually by the Ministry of Health and Welfare. The survey involves approximately 6,000 households in all parts of Japan. Since 1985 the survey has provided information on the various nutrients and food items consumed by households. The major limitation of the survey is that differences in classifications and tabulations sometimes creates difficulties in drawing comparisons between years and between household types. Information is collected over three days in November for individual members of each household surveyed. Prior to 1972 the data were collected in May in most of the survey years.

The reason that data from the *Kakei Chosa Nenpo* [Family Income and Expenditure Survey] (a survey conducted by the Management and Coordination Agency since 1931) have not been used is that it is not possible from this survey to accurately estimate consumption of foods eaten outside the home. This is a significant weakness since the consumption of foods outside the home has become more important lately.[2] The *Kakei Chosa Nenpo* covers 8,000 households and provides information on prices, expenditure and income, features that have made it a popular data source in consumption studies.

The first year included in this study was 1974, the reason being that the Ministry of Health and Welfare has been publishing information by regions only since that year. The most recent year included in the study period was 1992. The main innovation of this paper is the analysis of data on a regional basis. In all, 12 regions were defined and these covered all 47 of Japan's prefectures. Except for the northern region of Hokkaido, which consists of a single prefecture, each region is made up of several prefectures. Table 1 lists the 12 regions, the prefectures in each and key features of the regions.

Table 1 Regions used in the analysis

Region	Prefectures forming region	Characteristics of region
Hokkaido	Hokkaido	Northernmost island of Japanese archipelago, predominantly mining and industry in the 1950s and 1960s Area: 835,000 km^2 Population 1970: 5.2 million 1993: 5.7 million
Tohoku	Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima	Northern part of Honshu, the main island, predominantly agricultural industries in the 1950s and 1960s Area: 669,000 km^2 Population 1970: 9.0 million 1993: 9.8 million
Kanto 1	Saitama, Chiba, Tokyo, Kanagawa	In and around Tokyo, manufacturing, commerce and political centre Area: 136,000 km^2 Population 1970: 24.1 million 1993: 32.3 million
Kanto 2	Ibaragi, Tochigi, Gumma, Yamanashi, Nagano	North-west of Toyko, predominantly agricultural in the 1950s and 1960s Area: 370,000 km^2 Population 1970: 8.1 million 1993: 9.9 million
Hokuriku	Niigata, Toyama, Ishikawa, Fukui	North of Kanto and Tokai, predominantly agricultural in the 1950s and 1960s Area: 252,000 km^2 Population 1970: 5.1 million 1993: 5.6 million
Tokai	Gifu, Aichi, Mie, Shizuoka	In and around Nagoya, predominantly manufacturing and agricultural in the 1950s and 1960s Area: 293,000 km^2 Population 1970: 11.8 million 1993: 14.4 million

Continued from page 3

Kinki 1	Kyoto, Osaka, Hyogo	In and around Osaka, predominantly commerce and manufacturing Area: 149,000 km^2 Population 1970: 14.5 million 1993: 16.8 million
Kinki 2	Nara, Wakayama, Shiga	North and south of Osaka, predominantly agricultural in the 1950s and 1960s Area: 124,000 km^2 Population 1970: 2.9 million 1993: 3.8 million
Chugoku	Yamaguchi Shimane, Okayama, Hiroshima, Yamaguchi	Western Honshu, predominantly manufacturing and agricultural in the 1950s and 1960s Area: 319,000 km^2 Population 1970: 7.0 million 1993: 7.8 million
Shikoku	Tokushima, Kagawa, Ehime, Kochi	Island south of Chugoku, predominantly agricultural in the 1950s and 1960s Area: 188,000 km^2 Population 1970: 3.9 million 1993: 4.2 million
N. Kyushu	Fukuoka, Saga, Nagasaki, Oita	Northern part of south-western island, predominantly mining and manufacturing and agricultural in the 1950s and 1960s Area: 178,000 km^2 Population 1970: 7.6 million 1993: 8.5 million
S. Kyushu	Kumamoto, Miyazaki, Kagoshima, Okinawa	Southern part of Kyushu including Okinawa, predominantly agricultural in the 1950s and 1960s Area: 266,000 km^2 Population 1970: 5.4 million 1993: 6.1 million

The Japanese diet

Quite a lot has been written about the Japanese diet and food consumption (see, for example, Tokoyama and Egaitsu 1994; Longworth 1983; Riethmuller and Kobayashi 1993; and Lee

1994). The basis of the diet has been rice, the consumption of which has been on a secular decline. In recent years, per person consumption has been between 70 and 80 kg. This is well below the consumption levels of the 1950s and 1960s when consumption in some years averaged over 120 kg per person. Fish and vegetables have also been a key part of the diet of the average Japanese, and the consumption of both has been increasing. Per person consumption has been highest in pork, although it has been losing ground to both beef and poultry. Survey results obtained by Riethmuller and Morison (1995) showed that for Japanese consumers the taste of beef is the attribute they like most about it, while the attribute liked most about pork and poultry is that of reasonable price. Beer consumption — which is by far the most important alcoholic beverage consumed in Japan — more than doubled between 1975 and 1992. This contrasted with fruit consumption, which fell by about 35 per cent in the same period (Table 2).

Table 2 Per person daily intake of foods in the Japanese diet, 1975 and 1992 (grams)

Item	1975	1992	Percentage change
Beef	12.7	20.6	62.2
Pork	26.4	24.8	-6.1
Poultry	13.6	18.9	39.0
Processed meats	8.8	10.0	13.6
Fish	94.0	96.8	3.0
Rice	248.3	197.3	-20.5
Wheat	90.2	85.3	-5.4
Sugar	14.6	10.6	-27.4
Milk	98.4	118.1	20.0
Beer	18.3	45.1	146.4
Vegetables	238.1	257.9	8.3
Fruit	193.5	125.1	-35.3

Note: The averages in this table were derived from the regional data. Each region's average consumption was weighted by the region's share of Japan's population and summed.

Source: Ministry of Health and Welfare, *Kokumin Eiyo Chosa (*1975 and 1992).

As noted in the introduction to this paper, and as the following examples from the 1960s illustrate, regional differences in diets are a feature of Japan. These differences are probably a reflection of factors such as differences in agricultural production between regions as well as social, economic and historical differences.

- Apples are produced in northern Honshu, the main Japanese island. Mandarins are produced mostly in south-western Japan, particularly in Shikoku (an island to the south-west of the southern part of Honshu), and in Kyushu, the large island located to the south of Honshu. In 1966 per person household purchases of apples and mandarins was 11.7 kg and 6.6 kg, respectively, in the north-eastern region of Tohoku. For this same year, consumption in Shikoku averaged 4.9 kg for apples and 10.5 kg for mandarins. Home-grown fruits are excluded from these consumption data, which came from the *Kakei Chosa Nenpo*.
- Traditionally, people in the western part of Japan would regard beef as meat, whereas those in the eastern and northern parts of Japan would regard pork as meat. According to the *Kakei Chosa Nenpo* for 1966, per person household purchases of beef and pork were 3.6 kg and 0.5 kg, respectively, in the Osaka–Kyoto–Kobe area, which is in western Japan. In the Tohoku region — located in the north-west of the main island of Honshu — beef consumption averaged 0.3 kg and pork consumption averaged 2.6 kg. Although beef consumption in the Tokyo –Yokohama area (eastern Japan) was higher at 1.4 kg, it was still well below average consumption in western Japan. On the other hand, pork consumption in Tokyo–Yokohama at 4.3 kg was above consumption in western Japan.
- People in Kanto (the central-eastern area around Tokyo) consumed 1.0 kg of tuna in 1966, much more than in Kinki (the central-western area around Osaka) and Kyushu. Consumption in these regions averaged 0.3 kg and 0.2 kg, respectively.
- Consumers in western Japan depended upon a variety of locally caught fish. By contrast, those in Tohoku and Hokkaido depended on salted fish. Per person household purchases of salmon in these northern regions averaged approximately 1.2 kg in 1966 compared with 0.11 kg per person in Shikoku and Kyushu.
- It is generally known that people in Kanto prefer more salty foods than those consumed by people in Kinki, who are said to prefer *usu-aji* (less salty and sweeter) taste. Per person purchases of *miso*, for example, were 4.8 kg in Kanto and 2.3 kg in Kinki in 1966, according to the *Kakei Chosa Nenpo*.

Data on food consumption in each of the 12 regions confirm what these examples are meant to convey — namely, that there have been substantial differences in diets between regions. However, it would be impractical and almost impossible to examine all aspects of the Japanese diet for regional differences. Therefore, a subset of foods — all of which are important

in the diet — have been selected. These are wheat, fish, rice, vegetables, sugar, fruits, milk, beef, pork, poultry, processed meats and beer. These last seven products are more typically Western than Japanese. Table 3 contains data on some of these food items for each of the regions for 1975 and for 1992.

Table 3 Per person daily food consumption in different regions of Japan, selected commodities, 1975 and 1992 (grams)

Region		Beef	Pork	Beer	Rice
Hokkaido	1975	2.8	24.6	17.6	233.2
	1992	11.3	32.1	56.8	177.8
Tohoku	1975	5.8	25.7	16.1	273.9
	1992	10.6	26.0	37.9	220.9
Kanto 1	1975	11.0	35.9	21.5	226.7
	1992	20.4	29.6	47.6	184.9
Kanto 2	1975	4.3	31.9	10.5	241.6
	1992	14.6	29.4	41.2	209.4
Hokuriku	1975	5.0	20.1	5.9	300.9
	1992	16.7	23.2	38.7	204.4
Tokai	1975	10.0	26.8	14.2	254.5
	1992	18.8	23.2	43.1	198.2
Kinki 1	1975	24.3	19.1	27.1	235.2
	1992	30.0	20.6	55.6	185.8
Kinki 2	1975	27.9	16.4	21.4	287.3
	1992	25.3	18.7	39.4	220.0
Chugoku	1975	19.2	18.4	19.2	247.6
	1992	27.3	20.8	49.4	194.6
Shikoku	1975	16.3	17.1	16.0	267.2
	1992	25.6	18.8	46.0	197.5
N. Kyushu	1975	16.9	20.7	14.7	235.2
	1992	22.3	22.0	37.2	201.3
S. Kyushu	1975	10.7	24.0	10.0	265.9
	1992	23.4	24.4	43.9	199.7

Source: Ministry of Health and Welfare, *Kokumin Eiyo Chosa* (1975 and 1992).

It is apparent from Table 3 that substantial differences exist in food consumption across the regions. For example, rice consumption in 1975 was 300.9 grams per day in Hokuriku, while in Kanto 1 it averaged 226.7 grams per day. By 1992 the difference in average consumption had shrunk to just less than 20 grams per day. The differences in 1975 between regions were even more dramatic for beef. Hokkaido's average consumption in 1975 was 2.8 grams, only one-

tenth of the daily consumption in Kinki 2. By 1992 the differences in beef consumption between the two prefectures had narrowed, so that average consumption in Hokkaido was 11.3 grams, while in Kinki 2 it was 25.3 grams. These two examples raise the interesting question: has the consumption of foods such as those in Table 3 become more variable across regions as Japanese eating habits have changed?

Variability across regions: 1974 consumption compared with 1992 consumption

To test whether there was more variability across regions in the last year of the sample period, as compared with the first year, the variances for the first and last year for each food were calculated using (1.0):

$$\sigma_{it}^2 = \sum_j \left(\frac{Q_{ijt} - \overline{Q}_{ijt}}{j-1} \right)^2 \qquad (1.0)$$

where σ_{it}^2 = variance of per person consumption of food i in year t
Q_{ijt} = per person consumption of food i in region j in year t
j = 1 to 12 representing the 12 regions
i = 1 to 12 representing the 12 food items
t = 1974 or 1992

Once these variances had been calculated, the hypothesis of no change in variability across regions for each food was tested by performing a series of F tests. The results indicated that the variance of consumption in 1974 was significantly greater than the variance in 1992 for beef, pork, fish, fruit and milk. This suggests that for these foods regional differences might have become less marked during the study period. On the other hand, there was no significant difference in the variability across regions of beer, poultry, processed meat, rice, wheat, sugar and vegetables. Furthermore, the data provided no evidence of the consumption of any food becoming more variable. In these tests, a 10 per cent level of significance was used.

The analysis of this section compared only the first and last year's food consumption data. The next part of this paper investigates the same question using all of the time-series data. The

results of this analysis provide evidence as to whether or not consumption patterns in the 12 regions are converging.

Are Japanese diets converging?

As a first step in investigating whether regional diets are converging, growth rates for the 12 food items included in the study are calculated for each of the regions using (2.0).

(2.0)

where Q_{ijt} = per person consumption of food i in region in year
β_{ij} = constant for food in region
= growth in per person consumption of food i in region
= 1 to 12 regions
= 1 to 12 food items
= 1974 to 1992

$Q_{ijt} = \beta_{ij} e^{r_{ij} t}$ (2.0) was estimated as

$$\ln Q_{ijt} = \beta_{ij} + r_{ijt} + \mu_{ijt} \qquad (2.1)$$

where μ_{ijt} = error term

The results from the estimation of (2.1) are presented in Tables 4, 5 and 6. Per person consumption of beef showed growth rates that were significant at the 0.1 per cent level or higher. The only exception was for Kinki 2, where beef consumption at the start of the study period was the highest of the 12 regions. Per person poultry consumption recorded positive growth in all 12 regions, while pork consumption, fish consumption and processed meat consumption showed mixed results. The strongest growth in fish consumption occurred in Kinki 2 and Kanto 1, the two regions containing Japan's major cities. The consumption of fruit per person declined in all regions, as did the consumption of rice. It is not clear why the consumption of fruit has been falling. The fall in rice consumption reflects changes in Japanese diets towards diets with more animal protein. Finally, per person consumption of milk and beer grew in all regions at rates that were highly significant in a statistical sense. Sugar consumption declined in all regions.

Table 4 Regional growth rates for the per person consumption of beef, pork, poultry and processed meats

Region	Beef	Pork	Poultry	Processed meats
Chugoku	1.68***		1.98***	
Hokkaido	5.96**		2.00*	1.40**
Hokuriku	5.74***		4.39***	1.62*
Kanto 1	3.65***	-1.20***	1.44***	
Kanto 2	6.98***		2.87***	1.05*
Kinki 1	1.14***		1.81***	
Kinki 2		1.70**	2.52***	
N. Kyushu	3.53***		1.29**	1.49**
S. Kyushu	3.93***	-1.46**	1.62**	
Shikoku	2.92***		2.41**	
Tohoku	5.57***	-0.79*	2.82**	1.26*
Tokai	3.53***		1.71***	1.63***

Notes: Asterisks indicate significance of estimated coefficients using a two-tailed test. The null hypothesis was that the coefficient was equal to zero.
*** denotes that the coefficient is significant at the 0.1 per cent level.
** denotes that the coefficient is significant at the 1 per cent level.
* denotes that the coefficient is significant at the 5 per cent level.

Table 5 Regional growth rates for the per person consumption of fish, fruit, rice and vegetables

Region	Fish	Fruit	Rice	Vegetables
Chugoku		-2.46***	-1.22***	
Hokkaido		-3.28***	-1.62***	
Hokuriku		-2.20***	-1.28***	
Kanto 1	0.86***	-2.63***	-0.87***	
Kanto 2		-2.27***	-1.47***	
Kinki 1	0.57***	-2.27***	-1.03***	
Kinki 2		-2.74***	-1.12**	
N. Kyushu		-3.19***	-1.05***	
S. Kyushu	0.77*	-2.43***	-0.85**	
Shikoku		-2.51***	-1.27***	
Tohoku		-2.29***	-1.39***	-0.49*
Tokai		-2.61***	-1.32***	

Notes: See Table 4.

Table 6 Regional growth rates for the per person consumption of milk, sugar, wheat and beer

Region	Milk	Sugar	Wheat	Beer
Chugoku	1.47***	-1.99***		6.53***
Hokkaido	1.53**	-2.41***		5.31***
Hokuriku	1.62***	-1.55***	-0.60*	8.10***
Kanto 1	0.79**	-2.22***		3.82***
Kanto 2	1.57***	-1.97***		7.04***
Kinki 1	0.99**	-2.09***		4.92***
Kinki 2	1.94***			5.34***
N. Kyushu	1.62***	-1.67***		4.90***
S. Kyushu	2.65***	-2.48***		7.26***
Shikoku	1.62**	-2.39***		7.22***
Tohoku	2.12***	-1.84**		5.36***
Tokai	1.11***	-1.88***	-0.19*	6.26***

Notes: See Table 4.

The second part of the analysis makes use of these growth rates just estimated. The only foods excluded were those where the estimated growth rate was not significantly different to zero. The premise is that if food consumption patterns in Japan's regions are indeed converging, one would expect that the levels of consumption in the initial year would be associated with the regional growth rates. To test this, the estimated growth rates in Tables 4, 5 and 6 were fitted to model (3.0)[1].

$$Q_{ij1974} = \alpha_{0i} + \alpha_{1i} r_{ij} = \varepsilon_{ij} \qquad (3.0)$$

where $Q_{ijt1974}$ = per person consumption of food i in region in 1974

r_{ij} = growth in per person consumption of food in region between 1974 and 1994 (estimated from 2.1)

α_{0i} = constant for food

α_{1i} = constant for food i

i = 1 to 12 food items

j = 1 to 12 regions

ε = error term

The results from fitting (3.0) to the data are presented in Table 7. If it is true that diets are converging across Japan, then a negative coefficient on per person growth rate in the consumption of a particular food would be expected. The negative coefficient indicates that those regions with high levels of per person consumption of a particular food in 1974 had low growth in the consumption of that food between 1974 and 1992, or, to put it another way, that the leaders are coming back to the pack. On the other hand, the negative coefficient indicates that regions with low levels of consumption of a particular food had high rates of growth in the consumption of that food. The negative relationship was found to exist for all of the food items considered, except for fruit, wheat and sugar. This suggests that diets are indeed converging

Table 7 Results of the regression of estimated growth and 1974 per person consumption

Food item	Estimated coefficient on per person growth in consumption
Beef	-23.3***
Pork	-10***
Poultry	-16.1***
Processed meats	-39.7***
Fish	-2.6***
Milk	-6.1***
Vegetables	-0.7***
Beer	-14.9**
Rice	-0.6*

Notes: See Table 4.

The evidence presented so far in this paper is that variability of per person food consumption in Japan is becoming less for some foods and that diets appear to be converging. The next part of the analysis will try to identify some of the factors associated with regional variations in diets.

Factors associated with the regional variations in diets

The main determinants of food consumption are the price of the food, the prices of substitutes and complements, and income. In empirical analysis, additional variables such as religion,

income distribution, urbanisation, physical stature and age structure of the population are often included as well. A recent paper by Tokoyama (1995) identifies a list of food items where consumption in Japan has declined in recent years, despite these foods having been found from cross-sectional studies to have positive or zero income elasticities. The list of such food items has increased in recent years. Tokoyama attributed the decline in food consumption to non-economic factors such as convenience and health concerns. It was not possible to obtain information on these and other variables that might influence consumption at a regional level. Moreover, because the prices for many of the foods being investigated were regulated — either directly or indirectly — by the Japanese government, it is unlikely that there would have been much variability across the regions. For these reasons, the analysis reported here is based upon dummy variables and time. Therefore, the results presented in this part of the paper need to be used with some care.

The yearly consumption data on each of the food items for each of the regions were combined, and dummy variables and time were added to give pooled time-series and cross-sectional data. A dummy variable was included to take account of rural and urban differences and this meant that the regions had to be classed as either urban or rural. Hokkaido, Tohoku, Kanto 2, Kinki 2, Hokuriku, Chugoku, Shikoku, North Kyushu and South Kyushu are predominantly rural regions, and were classified as such. On the other hand, Kanto 1, Kinki 1 and Tokai were considered to be predominantly urban regions. A set of dummy variables was also included to capture geographic differences. Hokkaido, Tohoku and Hokuriku were grouped as northern regions; Kanto 1, Kanto 2 and Tokai were considered to be eastern regions; Kinki 1, Kinki 2 and Chugoku were classed as western; and North Kyushu, South Kyushu and Shikoku were categorised as southern regions. In addition, interaction terms were included between time and the regional urban dummy, and the geographic location dummy.

Model (4.0) was estimated for each commodity.

$$Q_{ijt} = \phi_{i0} + \phi_{i1} D + \phi_{i2} R_1 + \phi_{i3} R_2 + \phi_{i4} R_3 + \phi_{i5} T + \phi_{i6} TD + \phi_{i7} TR_1 + \phi_{i8} TR_2 + \phi_{i9} TR_3 + \varepsilon_{ijt} \qquad (4.0)$$

where Q_{ijt} = per person consumption of food in region in year
ϕ_{i0} to ϕ_{i9} = constants for food
D = 0 for predominantly urban regions
1 for predominantly rural regions

R_k	=	location dummy. When $k = 1$, $R = 1$ for north, 0 elsewhere; when $k = 2$, $R = 1$ for south, 0 elsewhere; when $k = 3$, $R = 1$ for east, 0 elsewhere.
i	=	1 to 12 food items
j	=	1 to 12 regions
T	=	time
ε_{ijt}	=	error term

The results from this analysis are presented in Tables 8, 9 and 10. Dummy variables and interaction effects where the coefficients were not significant at the 5 per level or better have been dropped from the models.

Table 8 Estimated coefficients for beef, pork, poultry and processed meats

Variable	Beef	Pork	Poultry	Processed meats
Intercept	25.777		15.767	10.249
	(0.993)***		(0.809)***	(0.476)***
Rural dummy	-4.375	-1.3298	-2.189	-1.781
	(1.054)***	(1.320)***	(0.858)*	(0.505)***
Northern dummy	-18.236	10.554	-4.796	-1.773
	(1.054)***	(1.320)***	(0.858)***	(0.505)***
Southern dummy	-8.218	4.538	3.297	
	(1.054)***	(1.320)***	(0.858)***	
Eastern dummy	-17.562	14.724	-2.549	
	(1.054)***	(1.320)***	(0.858)**	
Time	0.232		0.303	
	(0.087)**		(0.071)***	
Northern dummy and time	0.294			
	(0.092)**			
Southern dummy and time	0.411	-0.257		
	(0.092)**	(0.116)*		
Eastern dummy and time	0.320			
	(0.092)***			
R^2	0.893	0.694	0.755	0.437
F statistic	201.735	54.964	74.709	18.818

Notes: Values in parentheses are standard errors. Asterisks indicate significance of estimated coefficients using a two-tailed test.
*** denotes that the coefficient is significant at the 0.1 per cent level.
** denotes that the coefficient is significant at the 1 per cent level.
* denotes that the coefficient is significant at the 5 per cent level.

Table 9 Estimated coefficients for fish, fruit, rice and vegetables

Variable	Fish	Fruit	Rice	Vegetables
Intercept	83.695	187.567	237.538	223.333
	(2.365)***	(5.600)***	(4.826)***	(6.188)***
Rural dummy	7.502		25.594	21
	(2.508)**		(5.118)***	(6.563)**
Northern dummy				29.590
				(6.563)***
Southern dummy				-15.607
				(6.563)*
Eastern dummy				29.388
				(6.563)***
Time	0.498	-3.916	-2.742	
	(0.207)*	(0.491)***	(0.423)***	
R^2	0.588	0.714	0.734	0.472
F statistic	34.605	60.347	66.868	21.617

Notes: See Table 8.

Table 10 Estimated coefficients for milk, sugar, wheat and beer

Variable	Milk	Sugar	Wheat	Beer
Intercept	97.110	15.923	100.151	2.443
	(3.311)***	(0.483)***	3.201)***	(2.124)***
Rural dummy			-12.168	-9.970
			(3.395)***	(2.253)***
Northern dummy		-2.863		
		(0.512)***		
Eastern dummy				-6.140
				(2.253)**
Time	0.925	-0.283		1.803
	(0.290)**	(0.042)***		(0.186)***
Urban rural dummy and time	0.853			
	(0.308)**			
R^2	0.558	0.669	0.352	0.774
F statistic	30.56176	48.929	13.177	82.796

Notes: See Table 8.

The significance of the rural dummy

The negative coefficient on the rural dummy for beef, pork, poultry, processed meats, wheat and beer suggests that people living in rural areas consume smaller amounts of these foods than people living in urban regions. The higher consumption of the meats in urban areas may be explained in part at least by urban consumers having higher incomes and greater access to a wider range of shopping facilities than people in rural areas. Also, people in urban areas tend to be younger, and young people are more likely to consume these foods than the older members of the population. The positive coefficients for fish, rice and vegetables suggests that consumers in rural regions consume greater quantities of fish, rice and vegetables than urban regions. Fish, rice and vegetables are more traditional Japanese foods. Therefore, these results suggest greater consumption of traditional foods in rural areas than in urban areas, which tends to be in agreement with anecdotal evidence.

The significance of the geographic location dummies

The western regions of Kinki 1, Kinki 2 and Chugoku were used as the base against which consumption in other geographic locations was compared. These regions were chosen as the base because per person consumption of western foods was generally higher in these three regions than in other parts of Japan. The geographic dummies suggested that western regions consume more beef, poultry, processed meat and sugar than northern regions. People living in the eastern, northern and southern regions consume more pork than people living in western regions. The result for beef and pork confirm the point made earlier in this paper that people in western Japan regard beef as meat, while those in eastern and northern Japan regard pork as meat. The results also indicate that Japanese in the northern and eastern regions consume greater amounts of vegetables than those in western regions and Japanese living in southern regions consume less vegetables than the western regions.

The significance of time

Time captures a number of effects, including income, change of taste, demographic change and technological developments. Hence it is not easy to interpret the results for time. Its coefficient indicated that it was positively correlated with the consumption of beef, poultry, fish, milk and beer. The coefficients for time were negative in the model where the dependent variable was the per person consumption of fruit, rice and sugar. As noted earlier, the consumption of these latter commodities declined in all regions of Japan during the test period.

The significance of the rural dummy and the geographical dummies combined with time

Only milk had a significant coefficient for the multiplicative terms involving the rural dummy and time. The effect was positive, suggesting that consumers in rural areas increased their consumption of milk more rapidly than urban consumers. The multiplicative terms involving the geographic location dummy and time were significant in the models for beef and pork. The estimated coefficients indicate that the consumption of beef increased more rapidly in each of the northern, southern and eastern regions in comparison with the western region. In the case of pork, consumption increased at a slower pace in the south as compared with the other parts of the country.

Implications and conclusions

The purpose of this paper was to investigate the consumption patterns of various foods across different regions of Japan. Data on 12 foods were examined for the period 1974 to 1992. The results obtained from analysis of cross-sectional and time-series data showed that the consumption of beef, poultry and vegetables seemed to be most influenced by whether the region was rural or urban and its geographic location. The analysis also revealed that there were marked differences in consumption of different foods across regions in 1974. While the differences still existed in 1992, there is evidence of convergence in the consumption of beef, pork, poultry, processed meats, fish, milk, beer, rice and vegetables across the regions.

Since Japan began opening its food markets to foreign supplies in the mid to late 1980s, increased market opportunities have been created for foreign supplies. However, the expense associated with doing business in Japan, combined with the limited resources available to most companies interested in supplying to this market, and the increasing price consciousness of Japanese consumers, means that promotional and market development funds have to be directed towards the markets where the benefits from such activities are most promising. The analysis in this paper, based as it is on regional level data, is a valuable first step in identifying those parts of Japan that could be targeted by exporters.

Foreign firms should not always regard Japan as a single homogenous market. The results obtained in this paper for beef indicate that regional differences, and rates of growth in consumption, are quite different across regions. This could be due to differences in demographics across regions, income distribution or cultural factors. For some other products, such as

vegetables and milk, these regional differences were not apparent. This suggests that targeted promotional and advertising campaigns may not be required for these products.

The fact that for some products there are regional differences in cuisine raises doubts about the importance of food processes/manufacturers attempting to achieve economies of scale in producing processed food. Smaller food-processing facilities producing a specific product for a particular regional market may be a more efficient production process for food-manufacturing companies. Furthermore, the existence of regional differences in a potential export market adds to the argument that firms in exporting countries derive important marketing insights by tying up with local firms in the market. Finally, besides assisting exporters in their market development activities, analysis of consumption on a regional basis is likely to result in improved forecasts of consumption of different foods.

There are a number of ways this research could be extended. The most obvious of these is further work on identifying the factors behind the differences in regional consumption patterns. At different times in this paper, reference has been made to the factors that could be behind the regional differences. It would be useful if those factors could be explicitly identified. The range of foods could also be enlarged, and possibly an even more disaggregated approach could be taken in the analysis. Also, the analysis reported here for Japan must raise doubts as to the approach that is often taken to other markets. If the case can be made that analyses of food consumption in a regional basis are necessary for Japan with its relatively homogeneous population, then the case is perhaps even stronger for regional analyses of countries such as Indonesia, Malaysia and the Philippines with their diverse blend of ethnic groups and cultures.

Notes

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1 A recent example of a product where trade barriers have been partly removed is apples, while the better known examples of reduced — but still very high — levels of border protection are beef and oranges. Details of these and other changes are provided by Reithmuller, Kobayashi and Shogenji (1996).

2 The Meat and Eggs Division of the Ministry of Agriculture, Forestry and Fisheries has estimated that in-home household consumption of beef and pork accounted for 69.5 per cent and 59.1 per cent of total consumption of beef and pork, respectively, in 1975. These percentages steadily declined to 55.7 per cent and 46.5 per cent in 1985, and to 45.9 per cent and 40.4 per cent in 1993. Evidence on the increase in consumption expenditure on foods eaten away from home is presented by Fujita and Chern (1994), who found that food away from home (FAFH) monthly expenditures during 1970 to 1989 increased at 8.48 per cent per annum, compared with 5.16 per cent for food eaten at home.

3 The *Kakei Chosa Nenpo* publishes its results on a regional basis as well. However, the regions used in this survey are not the same as those used in the *Kokumin Eiyo Chosa.*

4 The analytical procedure followed in this part of the paper is based loosely upon the approach used in research on income convergence, carried out by Barro and Sala-i-Martin (1991), Browne (1989), Sherwood–Call (1996) and others.

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