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Art and Culture in Japan?

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## ABSTRACT (350 words)

This paper attempts to show that consumption inequality of art and culture has expanded between the low-income family group and the high-income family group since the structural reform which the *Koizumi* government started in 2001. For this purpose, expenditure elasticities of art and culture by income level are estimated and compared, using the original method based on Aguiar and Bils (2015). First, the expenditure elasticities of each good in 1999 and those in 2004 are estimated. Second, the expenditure elasticities of each good in 1999 and 2004 are estimated by income level. Then, the expenditure elasticities by income level are compared between 1999 and 2004, standardizing expenditure elasticities of art and culture by dividing by expenditure elasticities of food.

Data from the Family Income and Expenditure Survey (FIES, *Zenkoku-syohijittai-chousa*) conducted by the Japanese Ministry of Internal Affairs and Communications (MIC) is used. The FIES reports expenditure on 10 categories and expenditures on over 900 subcategories. This paper estimates expenditure elasticities by categories. They are: (1) food; (2) housing; (3) fuel, light, water charges; (4) furniture and household utensils; (5) clothes and footwear; (6) medical care; (7) transportation and communication; (8) education; (9) reading and recreation (*Kyouyougoraku*) which includes consumption of art and culture; and (10) others living expenditures. Furthermore, the FIES reports subcategories like (9-1) admissions fees, movies, plays, cultural establishments (*Choushi, Kanran*).

The expenditure elasticities of 10 categories ((1) – (10)) and 1 subcategory ((9-1)) are estimated using Stata 14. While the estimated expenditure elasticities of (9) reading and recreation are over 1, the estimated expenditure elasticities of (9-1) admissions fees, movies, plays, cultural establishments, etc. are lower than 1. This means that reading

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\* I would like to thank Colin McKenzie for helpful comments on an earlier version. This study uses microdata obtained from the Family Income and Expenditure Survey (FIES, *Zenkoku-syohijittai-chousa*), which is provided by the National Statistics Center through Hitotsubashi University in accordance with the Statistics Act.

and recreation are generally luxury goods and that concert tickets and museum tickets are necessities of life. The estimated expenditure elasticities by income level shows that consumption inequality of both (9) reading and recreation and (9-1) admissions fees, movies, plays, cultural establishments, etc. have expanded for the period between 1999 and 2004.

**Keywords:** inequality, expenditure elasticity, demand, consumption, art and culture

**JEL Classification Codes:** D12, D31, D63,

## 1. Introduction

Since Thomas Piketty's (2014) book *Capital in the Twenty-First Century* became a bestseller, income inequality has become one of the hot issues around the world. Recently, income inequality has also become one of the big issues in Japan. According to the report published by OECD (2015) (P. 29, L.L. 12-14), Japan had the sixth highest relative poverty rate among the OECD countries in 2012, and the report suggested that the large income inequality of Japan might result from fiscal consolidation and regulatory reform (OECD). The OECD Economic Survey of Japan in 2013 (OECD, 2013) reported that Japan is the only OECD country where the poverty rate for all working households and all households with children increases when account is taken of the redistribution policies by the *Koizumi* government.

The relationship between income inequality and consumption inequality of art and culture is also worth discussing. There are many empirical studies concerning income inequality and consumption inequality. Slesnick (2001) focuses on the consumption inequality as social welfare and investigates the various aspects of the relationship between inequality in the U.S. Influenced by Slesnick (2001), Kruger and Perri (2006) focus on the relationship between an increase in income inequality and a rise in consumption inequality. Kruger and Perri (2006) establish that an increase in income inequality has not expanded the consumption inequality in the U.S. Aquiar and Bils (2015) estimate consumption inequality to figure out how consumption inequality has mirrored income inequality in the U.S., controlling for mis-measurements in the consumer expenditure survey.

The purpose of this study is to show the expansion of consumption inequality of art and culture after the structural reform by the *Koizumi* government that started in 2001. In order to examine whether consumption inequality of art and culture has expanded since the structural reform started, this study estimates expenditure elasticities of art and culture by income level. This paper attempts to measure consumption inequalities, using the original model based on Aquiar and Bils (2015) that assumed expenditure elasticities are constant across time. This paper proposes the model where expenditure elasticities varies with time. For the purpose of this study, the time varying expenditure elasticities is more appropriate because the structural reform led the structural change of Japanese economy and could cause the change of expenditure elasticities. Therefore, the contributions of this study are: (1) to propose the model with time varying expenditure elasticities, controlling for mis-measurements; and (2) to show the expansion of consumption elasticities that caused by the structural reform.

The rest of this paper is organized as follows. Section 2 summarizes how the structural reform by the Koizumi government cause the expansion of inequality in Japan. Section 3 shows the estimation method of expenditure elasticities in this paper. Section 4 explains the source of the study data. Section 5 discusses the estimated results. Section 6 contains some belief summaries and the idea of future research.

## 2. The Structural Reform by the *Koizumi* Government

On April 26, 2001, the structural reform by the *Koizumi* government begun to aim to reduce the national debt which has caused by national expense on social securities. As a result, Japan moved towards a smaller government and income inequality of Japan expanded (Awasawa (2010)). Song (2012) summarizes that one notable characteristic of the structural reform by Koizumi government is the “basic policies for economic and fiscal management and reform” (*Kongo-no-keizaizaiseiunnei oyobi keizaishakai no kouzoukaikaku-nikannsuru-kihonhousin*) which is widely well-known as a “big-boned policy” (*Honebuto-no-houshin*). The big-boned policy is a set of policy guidelines which was approved in 2001 for the first time and had been revised every year. The first big-boned policy which was approved in 2001 aims to keep the amount of national debt under 30 trillion yen as a first step of fiscal consolidation in 2002. Additionally, the second big-boned policy which was approved in 2002 aims to improve primary balance from the red to the black by 2010. Following such big-boned policies, the *Koizumi* government reduced national expense on social security (Jinno (2006); and Konishi (1997)). Though the redistribution policies by the *Koizumi* government was needed for sustainable social securities (for example, Doi (2008) mentions why the structural reform was needed.), income inequality was expanded in Japan (OECD (2013) and (2015)).

## 3. Model: Demand System Estimates of Consumption Inequality

Based on Aquiar and Bills (2015), this paper estimates expenditure elasticities of each goods. Since the structural could change expenditure elasticities for each good, this paper attempt to estimate time varying expenditure elasticities for each good. While Aquiar and Bills (2015) assumes that expenditure elasticities for each good are constant across time, this paper assumes that expenditure elasticities for each good are different by time.

Let  $h = 1, \dots, H$  denote households;  $i = 1, \dots, I$  denote income groups;  $j = 1, \dots, J$  denote good categories; and  $t$  denote time.  $x_{hjt}$  denotes the reported expenditure of

goods  $j$  at time  $t$  by household  $h$ . The reported expenditure  $x_{hjt}$  includes mis-measurements because households may answer their expenditures in questionnaires roughly.

$$x_{hjt} = x_{hjt}^* e^{\varsigma_{hjt}}, \quad (2)$$

where  $x_{hjt}^*$  is the true expenditure of goods  $j$  at time  $t$  by household  $h$  and  $\varsigma_{hjt}$  is mis-measurements of goods  $j$  at time  $t$  by household  $h$ . Here, mis-measurements can be decomposed as follows:

$$\varsigma_{hjt} = \psi_t^j + \phi_t^i + v_{hjt}, \quad (3)$$

where  $\psi_t^j$  is mis-measurements of goods  $j$  in time  $t$ , which is common across households;  $\phi_t^i$  is mis-measurement of income group  $i$  in time  $t$ , which is common across goods; and  $v_{hjt}$  is the residual measurement error, which is assumed to follow the standard normal distribution.

Assume that the first-order expansion in true expenditure satisfies:

$$\ln x_{hjt}^* - \ln \bar{x}_{jt}^* = \alpha_{jt}^* + \sum_{j=1}^J \beta_{jt} \ln x_{hjt}^* + \Gamma_{jt} Z_{ht} + \varphi_{hjt}, \quad (4)$$

where  $\bar{x}_{jt}^*$  is the true average expenditure of on goods  $j$  at time  $t$ ,  $Z_h$  is a vector of demographic dummies based on number of families and number of earners,  $\alpha_{jt}^*$ ,  $\beta_{jt}$ , and  $\Gamma_{jt}$  are estimated coefficients, and  $\varphi_{hjt}$  is the taste shock which is specific to expenditure on goods  $j$  at time  $t$  by household  $h$ .

$\ln x_{hjt}$  can be decompose into mis-measurements and measurement error as follows:

$$\ln x_{hjt} = \ln x_{hjt}^* e^{\varsigma_{hjt}} = \ln x_{hjt}^* + \varsigma_{hjt}. \quad (5)$$

Then, in terms of observables, equation (4) can be written into the estimated model as follows:

$$\ln x_{hjt} - \ln \bar{x}_{jt} = \alpha_{jt} + \sum_{j=1}^J \beta_{jt} \ln x_{hjt} + \Gamma_{jt} Z_{ht} + u_{hjt}, \quad (6)$$

$$u_{hjt} = \phi_t^i + v_{hjt} + \varphi_{hjt}, \quad (7)$$

Where  $u_{hjt}$  is the residual term which includes mis-measurements in equation (3)

except for  $\psi_t^j$  and the taste shock because  $\ln x_{hjt} - \ln \bar{x}_{jt}$  differences out  $\psi_t^j$  and leaves  $\alpha_{jt} = \alpha_{jt}^* + (\sum_{j=1}^J \beta_{jt} \ln x_{hjt}^* - \sum_{j=1}^J \beta_{jt} \ln x_{hjt})$ .

According to Aquiar and Bills (2015), dependent variable in equation (6),  $\ln x_{hjt} - \ln \bar{x}_{jt}$ , should be replaced with  $\tilde{x} \equiv \frac{x_{hjt} - \bar{x}_{jt}}{\bar{x}_{jt}}$ . The reason for this is that the log specification is inappropriate when  $x_{hjt}$  takes zero.

$$\tilde{x} \equiv \frac{x_{hjt} - \bar{x}_{jt}}{\bar{x}_{jt}} = \alpha_{jt} + \sum_{j=1}^J \beta_{jt} \ln x_{hjt} + \Gamma_{jt} Z_{ht} + u_{hjt}, \quad (8)$$

At the first stage, equation (8) is estimated to obtain the estimates of the expenditure elasticities of each good,  $\beta_{jt}$ .

At the second stage, the true demand system (equation (4)) is estimated. using the estimates of equation (8).

$$\widehat{x}_{hjt} \equiv \tilde{x} - \widehat{\Gamma}_{jt} Z_{ht}, \quad (9)$$

where  $\widehat{\Gamma}_{jt}$  is the estimates of  $\Gamma_{jt}$ . Equation (10) is driven from equations (4) and (9).

$$\begin{aligned} \widehat{x}_{hjt} &= \alpha_{jt} + \sum_{j=1}^J \beta_j \ln x_{hjt}^* + u_{hjt}, & (10) \\ &= \alpha_{jt} + \sum_{j=1}^J \beta_{jt} \ln x_{hjt}^* + \phi_t^i + v_{hjt} + \varphi_{hjt}, \\ &= \alpha_{jt} + \sum_{i=1}^I \sum_{j=0}^J \beta_{ijt} \ln x_{ihjt}^* + \phi_t^i + \{(\sum_{j=1}^J \beta_{jt} \ln x_{hjt}^* - \sum_{i=1}^I \sum_{j=0}^J \beta_{ijt} \ln x_{ihjt}^*) + v_{hjt} + \varphi_{hjt}\}, \\ &= \alpha_{jt} + \sum_{i=1}^I \sum_{j=0}^J \beta_{ijt} \ln x_{ihjt}^* + \phi_t^i + \varepsilon_{hjt}, \end{aligned}$$

where  $\varepsilon_{hjt} = (\sum_{j=1}^J \beta_{jt} \ln x_{hjt}^* - \sum_{i=1}^I \sum_{j=0}^J \beta_{ijt} \ln x_{ihjt}^*) + v_{hjt} + \varphi_{hjt}$  is the standard disturbance.

Assume that equation (10) can be estimated, using observables as follows;

$$\widehat{x}_{hjt} = a_{jt} + \sum_{i=1}^I \sum_{j=0}^J b_{ijt} \ln x_{ihjt} + \sum_{i=1}^I c_{it} D_{it} + d_{hjt}, \quad (11)$$

where  $D_{it}$  is an income dummy, which takes 1 if household  $h$  belongs to income level  $i$  at time  $t$ ;  $a_{jt}$ ,  $b_{ijt}$ , and  $c_{it}$  are estimated coefficients; and  $d_{hjt}$  is the standard disturbance. In this paper, households are divided into five group by annual family

income level. They are: (1) the annual family income is less than 3 million yen; (2) the annual family income is between 3 million yen and 6 million yen; (3) the annual family income is between 6 million yen and 9 million yen; (4) the annual family income is between 9 million yen and 12 million yen; and (5) the annual family income is 12 million yen and more. To compare the expenditure elasticities among five income groups, the estimates of the expenditure elasticities of art and culture by income level,  $b_{ijt}$  is standardized by dividing expenditure elasticities of food. The standardized expenditure elasticities of art and culture represents the percent change of expenditure on art and culture which is caused by 1% increase of expenditure on food. If expenditure on food increases, the low-family-income group are expected to reduce expenditure on art and culture more than the middle-family-income group. If expenditure on food increases, the high-family-income group are expected to reduce expenditure on art and culture less than the middle-family-income group. As a consequence, higher income level could be related with higher expenditure elasticities of art and culture standardized by those of food.

#### 4. Data

In order to estimate expenditure elasticities of art and culture, this study uses the microdata which is obtained from the Family Income and Expenditure Survey (FIES, *Zenkoku-syouthijittai-chousa*) conducted by the Japanese Ministry of Internal Affairs and Communications (MIC), which is provided by the National Statistics Center through Hitotsubashi University in accordance with the Statistics Act. Though the FIES has conducted every five years since 1959, only the microdata of the FIES in 1989, 1994, 1999, 2004 are available. Because the purpose of this study is to examine whether the structural reform which started in 2001 led to the expansion of consumption inequality of art and culture, the microdata in 1999 and 2004 are used.

The FIES in 1999 includes 44,540 households with two or more family members and the FIES in 2004 includes 43,862 households with two or more family members. This study excludes the samples with missing data from the dataset. This study also excludes the samples which reports zero expenditure because the estimated models needs the log specification. As a result, 1,115 samples are used to estimate expenditure elasticities in 1999 while 900 samples are used to estimate expenditure elasticities in 2004.

The FIES reports expenditure on 10 categories and expenditures on over 900 subcategories. This paper estimates expenditure elasticities by categories. They are: (1) food; (2) housing; (3) fuel, light, water charges; (4) furniture and household utensils; (5)

clothes and footwear; (6) medical care; (7) transportation and communication; (8) education; (9) reading and recreation (*Kyouyougoraku*) which includes consumption of art and culture; and (10) Others. Furthermore, the FIES reports subcategories like (9-1) admissions fees, movies, plays, cultural establishments (*Choushi, Kanran*).

Theoretically, expenditure elasticities of necessary goods are lower than 1 while expenditure elasticities of luxury goods are larger than 1. As a consequence, the estimates of expenditure elasticities of (1) food are expected to be lower 1 while the estimates of expenditure elasticities of (9) reading and recreation are expected to be larger than 1. Moreover, luxury goods ((9) and (9-1)) have larger expenditure elasticity values. Therefore, concert tickets and museum tickets will have a larger expenditure elasticity value than reading and recreation.

## 5. Estimated Results

The expenditure elasticities of 10 categories ((1) – (10)) and 1 subcategory ((9-1)) are estimated using Stata 14. At the first stage, expenditure elasticities of each good are estimated. Equation (8) was regressed  $J \times 2$  times to obtain the time varying expenditure elasticities. Tables 1 and 2 reports the estimates of expenditure elasticity in 1999 and 2004, respectively. In both tables, the estimated expenditure elasticities of (9) reading and recreation are over 1 while the estimated expenditure elasticities of (9-1) admissions fees, movies, plays, cultural establishments, etc. are lower than 1. This means that reading and recreation are generally luxury goods and that concert tickets and museum tickets are necessities of life.

[Table 1 around here]

[Table 2 around here]

At the second stage, expenditure elasticities of each good by income level are estimated. Equation (11) was regressed  $j \times t$  times to obtain the time varying expenditure elasticities. Tables 3 and 4 reports the estimates of expenditure elasticity by income level, the ratio of culture and recreation to food expenditure elasticity by income level, and the ratio of admission fees etc. to food expenditure elasticity by income level in 1999 and 2004, respectively. Since the ratios of recreation and culture to food expenditure elasticity are lower than 1, an increase of expenditure on food led a decrease of expenditure on reading and recreation, except for high-family income group and very high-income family group (income 4 and income 5). Since the ratios of recreation and culture to food expenditure elasticity are lower than 1, an increase of expenditure on

food led a decrease of expenditure on reading and recreation, except for very high-income family group (income 5). These are possibly because the families that enough rich to enjoy art and culture prefer expensive foods with better quality to cheap foods.

Figure 1 shows the change of the ratio of recreation and culture to food expenditure elasticity by income level. Figure 2 shows the change of the ratio of admission fees etc. to food expenditure elasticity by income level. The estimated expenditure elasticities by income level shows that consumption inequality of both (9) reading and recreation and (9-1) admissions fees, movies, plays, cultural establishments, etc. have expanded for the period between 1999 and 2004, decreasing of expenditure on art and culture of low-income family group (income 1 and income 2).

[Table 3 around here]

[Table 4 around here]

[Figure 1 around here]

[Figure 2 around here]

## 6. Concluding Remarks

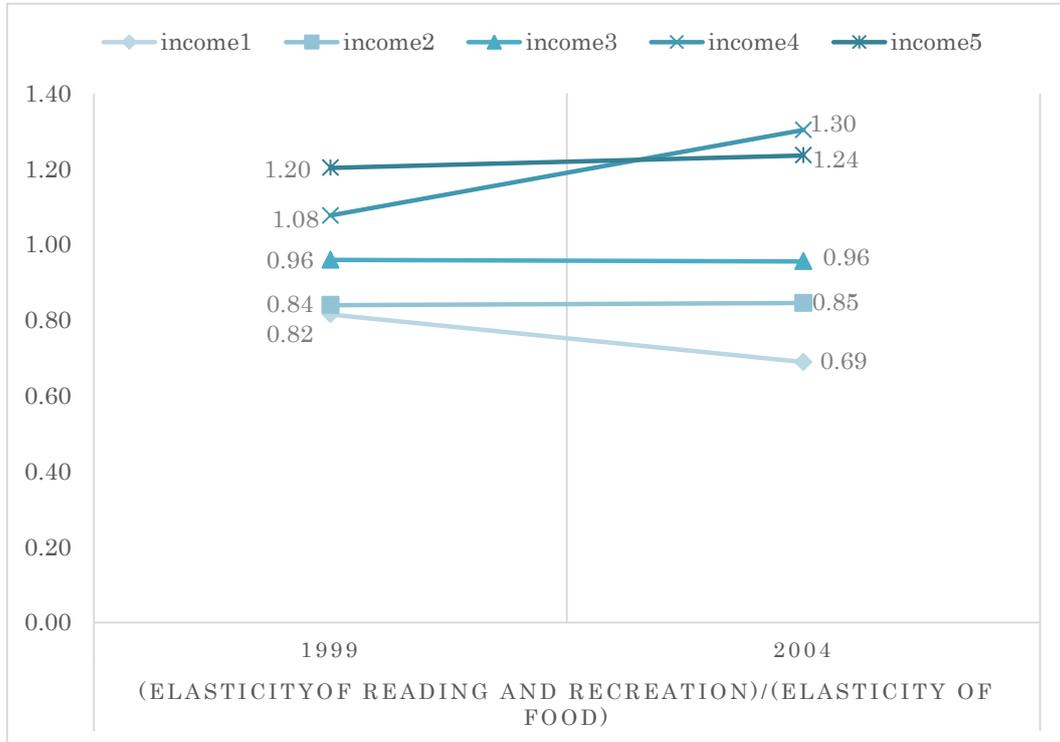
The purpose of this paper is to examine hypothesis that consumption inequality of art and culture has expanded since the structural reform by the *Koizumi* government in 2001. For this purpose, expenditure elasticities of reading and recreation which includes art and culture are estimated, using the original method based on Aguiar and Bils (2015). At the first stage, the expenditure elasticities of each good are estimated. At the second stage, the expenditure elasticities of each good by income level are estimated and compared between 1999 and 2004. The estimated results support the hypothesis. Both the consumptions inequality of reading and recreation and the consumption inequality of admissions fees, movies, plays, cultural establishments, etc. have expanded. Moreover, the estimated results show that the expansion of the consumption inequality of admissions fees, movies, plays, cultural establishments, etc. between was larger than that of culture and recreation.

An expansion of consumption inequality of art and culture does not always mean inequality of opportunities to enjoy art and culture. For example, low-family-income-group might enjoy more free music concerts than high-family-income-group. In the further research, activities on reading and recreation by income level need to be compared.

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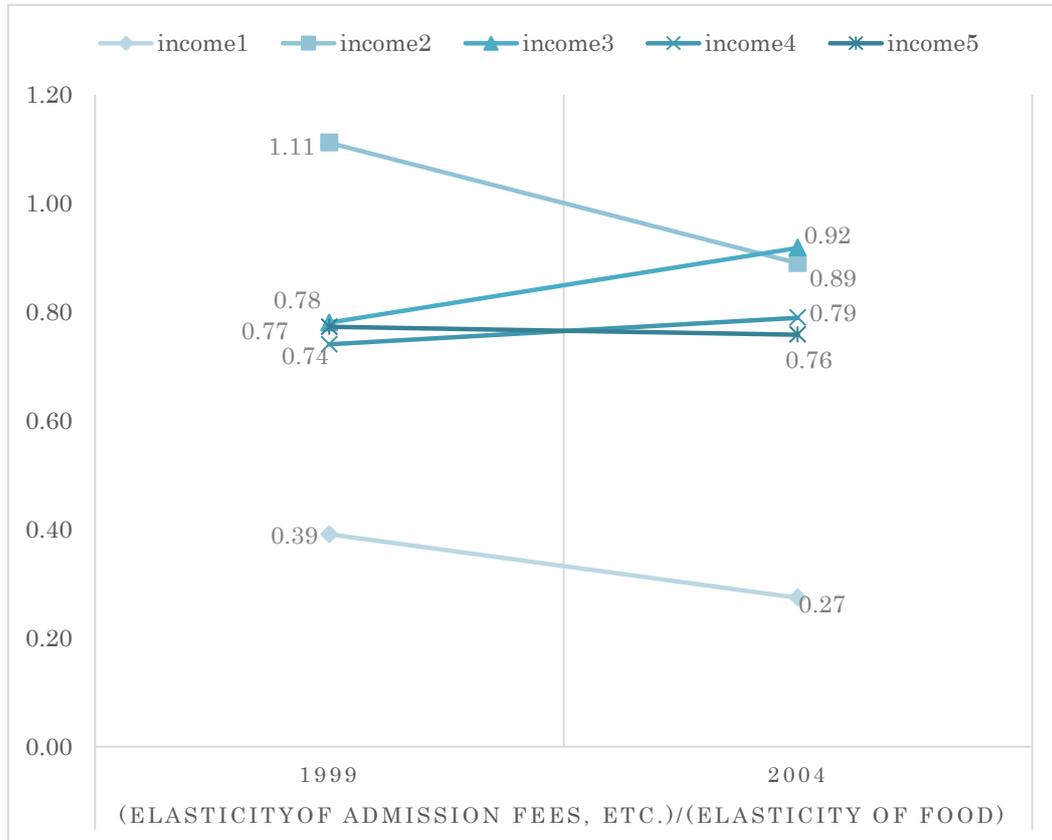
**Figure 1: The Ratio of Recreation and Culture to Food Expenditure Elasticity by Income Level**



**Notes:**

- [1] income 1: the annual family income is less than 3 million yen;
- income 2: the annual family income is between 3 million yen and 6 million yen;
- income 3: the annual family income is between 6 million yen and 9 million yen;
- income 4: the annual family income is between 9 million yen and 12 million yen;
- income 5: the annual family income is 12 million yen and more

**Figure 2: The Ratio of Admissions Fees, etc. to Food Expenditure Elasticity by Income Level**



**Notes:**

- [1] income 1: the annual family income is less than 3 million yen;
- income 2: the annual family income is between 3 million yen and 6 million yen;
- income 3: the annual family income is between 6 million yen and 9 million yen;
- income 4: the annual family income is between 9 million yen and 12 million yen;
- income 5: the annual family income is 12 million yen and more

**Table 1: Estimates of Expenditure Elasticity in 1999**

	Share	Elasticity	SE
(1) Food	27.4	0.96	(0.01)
(2) Housing	3.6	0.88	(0.06)
(3) Fuel, light, water charges	7.0	0.85	(0.01)
(4) Furniture & household utensils	3.4	1.18	(0.03)
(5) Clothes & footwear	4.9	0.82	(0.02)
(6) Medical care	3.2	0.94	(0.03)
(7) Transportation & communication	10.7	1.50	(0.05)
(8) Education	8.0	0.77	(0.03)
(9) Reading & recreation	9.3	1.02	(0.02)
(10) Other living expenditure	22.4	0.88	(0.02)
(9-1) Admissions fees, movies, plays, cultural establishments, etc.	0.8	0.78	(0.02)

**Notes:**

[1] Column 2 (Share) reports the share of consumption expenditure.

[2] SE stands for standard error.

**Table 2: Estimates of Expenditure Elasticity in 2004**

	Share	Elasticity	SE
(1) Food	25.3	0.93	(0.01)
(2) Housing	3.7	0.96	(0.08)
(3) Fuel, light, water charges	7.2	0.99	(0.01)
(4) Furniture & household utensils	3.0	1.10	(0.03)
(5) Clothes & footwear	4.1	0.82	(0.02)
(6) Medical care	3.8	0.88	(0.03)
(7) Transportation & communication	13.5	1.67	(0.06)
(8) Education	9.3	0.81	(0.04)
(9) Reading & recreation	9.9	1.05	(0.02)
(10) Other living expenditure	20.2	0.91	(0.03)
(9-1) Admissions fees, movies, plays, cultural establishments, etc.	0.9	0.79	(0.02)

**Notes:**

[1] Column 2 (Share) reports the share of consumption expenditure.

[2] SE stands for standard error.

**Table 3: Estimates of Expenditure Elasticity by Income level in 1999**

	income 1	income 2	income 3	income 4	income 5
Food	0.69 (0.44)	0.78 (0.02)	0.95 (0.01)	1.01 (0.01)	1.10 (0.01)
Reading & recreation	0.56 (2.48)	0.65 (0.05)	0.91 (0.03)	1.09 (0.03)	1.33 (0.04)
Admissions fees, movies, plays, cultural establishments, etc.	0.27 (0.83)	0.86 (0.05)	0.74 (0.03)	0.75 (0.03)	0.85 (0.03)
$e_{reading \& recreation}/e_{food}$	0.82	0.84	0.96	1.08	1.20
$e_{admissions \ fees,etc.}/e_{food}$	0.39	1.11	0.78	0.74	0.77

**Table 4: Estimates of Expenditure Elasticity by Income level in 2004**

	income 1	income 2	income 3	income 4	income 5
Food	0.53 (0.07)	0.78 (0.02)	0.85 (0.01)	0.98 (0.02)	1.19 (0.02)
Reading & recreation	0.36 (0.25)	0.66 (0.05)	0.81 (0.04)	1.28 (0.04)	1.47 (0.04)
Admissions fees, movies, plays, cultural establishments, etc.	0.14 (0.30)	0.69 (0.05)	0.78 (0.03)	0.78 (0.04)	0.90 (0.03)
$e_{reading \& recreation}/e_{food}$	0.69	0.85	0.96	1.30	1.24
$e_{admissions \ fees,etc.}/e_{food}$	0.27	0.89	0.92	0.79	0.76