A Test of the Full Insurance Hypothesis: The Case of Japan*†

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ABSTRACT. Exploiting the panel data structure of the Family Income and Expenditure Survey, compiled from 1989 to 1997 by the Japanese Bureau of Statistics, this paper explores how effectively idiosyncratic shocks are shared among consumers in Japan. Tests are conducted for the total consumption, together with each category of consumption expenditures. In addition, the empirical analysis of the paper accounts for the disaster shock caused by the Hyogo Earthquake that took place in January 1995. While the overall empirical results indicate that the full insurance hypothesis is strongly rejected, they suggest that idiosyncratic shocks are insured at least partially. With respect to the effect of the earthquake shock, the residents in the earthquake area indeed bore more shocks than those in other regions. The paper also points out that the extent of risk-sharing among households in Japan is fairly similar to that in the US.

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1. Introduction How effectively idiosyncratic shocks are insured among consumers, families, cohorts, regions, and countries has been explored most intensively in consumption literature. The main reason for a strong interest in tests of consumption insurance is that the knowledge as to the degree of insurance for idiosyncratic shocks is essential in constructing reasonable macroeconomic models, based on microeconomic theory. More concretely, if idiosyncratic shocks are well insured among consumers, then macroeconomists can adopt a representative agent framework as an appropriate model, otherwise they have to construct alternative models.

It is well recognized in the literature that 'insurance' includes not only insurance contracts offered in financial markets, but also arrangements implicitly made in communities, such as altruistic family linkages and mutual aids, and governmental assistance, such as welfare programs and public insurance. The literature has indeed examined empirical implications of consumption insurance using micro data available from developing countries where financial and insurance markets have not been developed well.

Townsend [1987] first derived clear empirical implications for the full insurance hypothesis. That is, if idiosyncratic shocks are perfectly shared in complete markets, then consumption moves similarly over time among consumers. More specifically, the individual consumption growth should be identical among consumers under the assumption of a utility function with constant relative risk aversion (CRRA). Cochrane [1991] and Mace [1991] empirically examined this implication concerning the full insurance hypothesis using micro panel data of US households[1]. More recently, the full insurance hypothesis has been examined for developed countries, other than the US, and for several developing countries (e.g. Townsend [1994], Atkeson and Ogaki [1996], and Ogaki and Zhang [2001]).

There have been, however, very few studies on the full insurance hypothesis in the literature on Japanese consumption behavior. One reason for this is that micro panel data themselves are hard to obtain for Japanese households. Among a few empirical studies on consumption behavior using panel data sets on Japanese households, Hayashi [1985a,

[1] Among the empirical studies using US micro household data, empirical results are mixed. Using the same data source (Consumer Expenditure Survey Data), for example, Mace [1991] supported the full insurance hypothesis, while Nelson [1994] rejected it, based on more accurate measurements of consumption and income.

1985b] conducted a test of the permanent income hypothesis. Hayashi [1985a] used the 1982 Survey of Family Consumption, compiled by the Economic Planning Agency. In this survey, each family is interviewed every three months for one year. Hayashi [1985b], on the other hand, used the 1981/82 Family Income and Expenditure Survey (hereafter referred to as FIES) conducted by the Japanese Bureau of Statistics. While the latter survey has been quite often regarded as cross-sectional micro data, it has panel data structure. That is, the survey interviews the same household every month for six months.

Making use of the above panel structure of the FIES from 1989 to 1997, we test the full insurance hypothesis. To the best of our knowledge, Kohara [2001] is the only study that investigated the full insurance hypothesis, based on micro panel data for Japanese households. Kohara [2001] used the 1993 and 1994 Japanese Panel Surveys of Consumption (hereafter, the JPSC), compiled by the Institute of Household Economy. The JPSC has surveyed the same households once a year since 1993. Although this survey is significant, given the scarcity of panel data sets in Japan, the JPSC has rather small samples of around 1000 households each year.

As has been well recognized, the interpretation of tests for the full insurance hypothesis requires serious and careful attention. The rejection of a certain specification of the hypothesis does not necessarily imply that idiosyncratic shocks are never insured among households. For example, our empirical specification may be subject to specification errors in preference or belief, while a rejection result may suggest the case where asymmetric information leads to not full insurance, but partial risk sharing. In addition, we have to pay careful attention to the econometric impact of preference shocks and measurement errors in interpreting estimation results.

Motivated by the above-mentioned possibilities, we are interested in not only whether the full insurance hypothesis is accepted, but also to which extent it holds. For this purpose, we carefully compare our empirical results with those based on US micro data in order to see how the extent of risk sharing differ between the two countries. In addition, we examine how the estimation results differ among subcategories of the consumption.

This paper is organized as follows. Following Mace [1991], Section 2 presents empirical specifications to test the fill insurance hypothesis. Section 3 reports the estimation results, while Section 4 concludes.

2. Empirical Specifications This subsection briefly reviews the aggregation theorem, on which Mace [1991] depends in deriving the empirical specifications to test the full insurance hypothesis. Suppose that a market exists for every possible state, and that a contingent claim for state $\omega(t)$ at time t is traded at price $p(\omega(t))$ when an economy starts at time 0. Agent i maximizes the following life-time expected utility at time 0:

$$\sum_{t=0}^{\infty} \frac{1}{(1+\rho)^t} \sum_{\omega(t)\subset\Omega(t)} (\pi(\omega(t))u(c_i(\omega(t))))$$

subject to

$$\sum_{t=0}^{\infty} \sum_{\omega(t)\subset\Omega(t)} p(\omega(t))\left(e_i(\omega(t)) + d_i(\omega(t)) - c_i(\omega(t))\right) = 0,$$

where ρ is the rate of time preference, $\Omega(t)$ denotes a set of states at time t, $\pi(\omega(t))$ is the objective unconditional probability that state $\omega(t)$ takes place at time t, and u is the time-additive and state-independent period utility. $u'(c_i(\omega(t))) > 0$ and $u''(c_i(\omega(t))) < 0$ are assumed to be true. c_i, e_i, and d_i indexed by state $\omega(t)$ imply agent i's consumption, exogenous income, and transfer from other consumers at state $\omega(t)$, respectively.

Assuming that λ_i is the Lagrange multiplier for agent i's life-time budget constraint, and deriving the first-order condition with respect to agent i's $\omega(t)$-consumption, we obtain

$$\frac{1}{(1+\rho)^t}\pi(\omega(t))u'(c_i(\omega(t))) = \lambda_i p(\omega(t)). \tag{1}$$

Using the above first-order condition (1), it is possible to derive from equation (1) the equality of the marginal rate of substitution (MRS) between two different states among consumers. That is, taking two states, $\omega(t)$ and $\omega(t+1)$ for example, we obtain, after canceling out the Lagrange multipliers λ_i and λ_j,

$$\frac{1}{1+\rho}\frac{u'(c_i(\omega(t+1)))}{u'(c_i(\omega(t)))} = \frac{1}{1+\rho}\frac{u'(c_j(\omega(t+1)))}{u'(c_j(\omega(t)))} \ \forall\ i \text{ and } j. \tag{2}$$

Notice that the homogenous belief about $\pi(\omega(t))$ is essential for the derivation of equation (2).

In addition, as Rubinstein [1974] showed, when the utility function u belongs to the hyperbolic absolute risk aversion family (the HARA family), the MRS, evaluated at individual consumption, is equal to that evaluated at aggregate consumption, or

$$\frac{1}{1+\rho}\frac{u'(c_i(\omega(t+1)))}{u'(c_i(\omega(t)))} = \frac{1}{1+\rho}\frac{u'(C(\omega(t+1)))}{u'(C(\omega(t)))} \ \forall \ i, \tag{3}$$

where $C(\omega(t)) = \frac{\sum_{i=1}^{I} c_i(\omega(t))}{I}$ or per capita aggregate consumption.

It is noted that both equations (2) and (3) hold for any realized path of consumption. Under the null hypothesis of full insurance, accordingly, these equations impose rather tight restrictions on the realized path of individual and aggregate consumption. More concretely, the realized first difference in consumption is perfectly equal among consumers, and is also equal to the realized difference in per capita aggregate consumption, under the constant absolute risk aversion preference ($u(c) = -\frac{1}{\sigma}\exp(-\sigma c)$, hereafter, the CARA preference). That is,

$$c_i(w(t+1)) - c_i(\omega(t)) = C(\omega(t+1)) - C(\omega(t)). \tag{4}$$

Similarly, the growth in consumption is equalized among consumers under the CRRA utility ($u(c) = \frac{c^{1-\gamma}}{1-\gamma}$), and is, accordingly, equal to the realized growth of per capital consumption:

$$\ln c_i(\omega(t+1)) - \ln c_i(\omega(t)) = \ln C(\omega(t+1)) - \ln C(\omega(t)). \tag{5}$$

Examining the empirical implications of equations (4) and (5) provides a simple, but powerful, tool for a test of the full insurance hypothesis. More specifically, such an econometric examination tests whether individual consumption growth is influenced by either common time-specific factors (the aggregate consumption growth) or person-specific factors.

In transforming these theoretical implications into statistical specifications, empirical researchers usually introduce either measurement errors or individual preference shocks as additive error terms. As Mace [1991] shows, if person-specific preference shocks are introduced in an additive (multiplicative) manner in the case of the CARA (CRRA) preference, then equations (4) and (5) with additive error terms are available as a proper specification.

However, the potential impact of preference shocks on leisure or working hours may cause serious econometric problems. We will come back to this issue later.

As is well-known, if the period utility is additively separable in not only time, but also goods, then equations (4) and (5) are applicable even to subcategories of the consumption[2]. As shown in the appendix by Mace [1991], however, even if the period preference is inseparable in goods, equations (4) and (5) may hold for subcategories. Examples include the case where the period utility is characterized by $\frac{1}{\alpha}\sum_{i=1}^{M}[\theta_i c_i(\omega(t))^{1-\gamma}]^{\frac{\alpha}{1-\gamma}}$, where M is the number of subcategories, and α, θ_i, and γ are given as parameters[3].

3. Data and Estimation Results

3.1. **Data** In this study, we use the Family Income and Expenditure Survey (FIES) for Japanese households from 1989 to 1997, conducted by the Japanese Bureau of Statistics. While it has been quite often regarded as cross-sectional micro household data, it indeed has panel data structure. The FIES interviews the randomly sampled households every month. The sample size is equal to around 4200 households. Replacing one sixth of the total sample (about 700 households) every month, the survey interviews the same households every month for six consecutive months.

The sample of the FIES consists of three major categories of households, the household of a proprietor, that with an employed head, and that with an unemployed head. While we attempt to make the estimation sample as large as possible, we exclude the first category of households from the full sample because no information on household income is available for these households. Our estimation sample consequently includes the second and third categories[4].

The categories of household consumption used in the empirical analysis are the total consumption, together with expenditure on services, nondurables, and durables, as broadly classified categories, and food, housing, utilities, furniture, clothes, medical expenses, trans-

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[2]For example, see Deaton [1992].

[3]If $\frac{\alpha}{1-\gamma}=1$, then the period utility is additively separable in subcategories of the consumption. The intra-period elasticity of substitution is infinite for $\gamma = 0$, while it is zero for $\gamma = \infty$.

[4]To examine the effect of the sex of household heads, we apply the same estimation procedure to the sample consisting of only male household heads. However, we could not find any substantial difference in the empirical results between the sample of male household heads and the full sample.

portation, education, and recreation, as finely classified categories. See the data appendix for more details on these categories of expenditure.

Exploiting the panel data structure of the FIES, we construct the first difference and growth in individual household consumption over nine years. Among possible constructions, we compute one-month changes, which are the shortest intervals, and five-month changes, which are the longest intervals. As is discussed later, the empirical results based on a long interval may take into consideration, the slow adjustment of household consumption, due to some frictions or habit formation.

As a variable representing a person-specific shock, we use the household income, which consists of labor income, personal business income, property income, and social security benefits. In addition, following Mace [1991], we use as another candidate of person-specific shocks, a change in the employment status (from employed to unemployed, and vice versa) among all household members.

When a change in the household income is used for representing person- specific shocks, the first difference in the household income is used in the first difference specification (4), while the growth rate of the household income is adopted in the growth specification (5). If the full insurance hypothesis holds, any realized person-specific shocks do not have any effect on a change in the household consumption. Thus, we examine whether the coefficient on person-specific shocks is significantly different from zero in order to test the above hypothesis.

We exclude any household in which the consumption and income data are not complete. The sample size consequently amounts to around 3000 each month. Table 1 reports the descriptive statistics for basic variables of the household consumption and income. As is reasonably expected, the monthly profile of consumption has a systematic pattern. For example, Table 2 shows how major items of consumption expenditures changed on the average in 1997; the consumption increased in March, July and December, while it decreased in January and April. The monthly profile in other years almost follows this same pattern.

Before reporting the estimation results, we make two remarks here. First, the empirical results may be subject to the heterogeneity of household members. To account for this possibility, we estimate the above specification using not only the variables defined per household, but also those adjusted by some household equivalence measures. The empirical results, with due consideration for such heterogeneity, do not differ substantially from those without one[5]. Throughout this paper, therefore, we assume that 'individuals' are interchangeable with 'households'.

Second, due to the Hyogo Earthquake that impacted the Kansai area in January 1995, the survey failed to interview a substantial fraction of the sample households in this area. After the earthquake, accordingly, the sample size was small in comparison with the usual size of 3000 households per month. It took six months for the sample size to return to the pre-disaster level. We refer to this point again later.

3.2. **Basic specifications** We first report the empirical results for the basic specification. When a change in the household income is used as a proxy for a person-specific shock, the empirical specification is characterized as

$$C^i_{t+1} - C^i_t = \alpha + \beta_1(C^a_{t+1} - C^a_t) + \beta_2(y^i_{t+1} - y^i_t) + \varepsilon^i_{t+1} \tag{6}$$

in the case of the first difference specification (4), and as

$$\ln \frac{C^i_{t+1}}{C^i_t} = \alpha + \beta_1 \ln \frac{C^a_{t+1}}{C^a_t} + \beta_2 \ln \frac{y^i_{t+1}}{y^i_t} + \eta^i_{t+1} \tag{7}$$

in the case of the growth specification (5), where C^i_t is the consumption of household i and y^i_t is its disposable income. $C^a_{t+1} - C^a_t$ is an average of the first difference of household consumption and $\ln \frac{C^a_{t+1}}{C^a_t}$ is the difference in logarithms of household consumption. Both ε^i_{t+1} and η^i_{t+1} are assumed to represent either measurement errors or idiosyncratic preference shocks. The least squares estimation is appropriate if the error term is not correlated with the explanatory variables. Under the null hypothesis of full insurance, the coefficient on a change in per capita aggregate consumption becomes one, while that on a change in the household income becomes zero ($\beta_1 = 1, \beta_2 = 0$).

We make several comments on the above basic specification. First, in the case of the

[5]One reasonable interpretation of the low impact of the equivalent measure correction is that the household characteristics do not change substantially within a short period such as six months.

growth specification, we use $\ln \frac{C^a_{t+1}}{C^a_t}$, the difference in logarithms of the average consumption, rather than the average of the difference in logarithms of the individual consumption. As Attanasio and Davis [1996] clarified, which of the two definitions of $\ln \frac{C^a_{t+1}}{C^a_t}$ to employ makes a substantial difference in testing the permanent income hypothesis as null; a rejection based on the former definition does not necessarily imply that the permanent income hypothesis is rejected. The difference between the two definitions, however, does not make any difference in testing the full insurance hypothesis as null, because either definition leads to identical $\ln \frac{C^a_{t+1}}{C^a_t}$ under the null hypothesis.

Second, there is one subtle statistical problem concerning the basic specification. The above specification is potentially subject to the errors-in-variables problem, because the right-hand side variable C^a_t is constructed from the left-hand side variable C^i_t. We can avoid this problem by defining the deviation from the aggregate variable as the right-hand side variable; for example, $\triangle C^i_t - \triangle C^a_t = \beta \triangle y^i_t + \xi^i_t$ in the case of the first difference specification. We estimated such specifications, and confirmed that the empirical results did not change in testing the full insurance hypothesis. Therefore, we report only the empirical results based on the basic specification.

Third, seasonality may affect the empirical results. We also estimated the basic specification with monthly dummy variables. While the monthly dummy variables of July and March, given December as the base month, were significantly positive at the 1% level, the coefficients on aggregate consumption and individual income were almost the same as in the case without monthly dummy variables.

Fourth, unless the period utility is separable between consumption and leisure, the above empirical specification may not hold. In other words, when the marginal period utility of consumption depends on leisure, the growth (or first difference) of household consumption may be influenced by changes in leisure spent by households. As a similar situation, consumption and leisure may be correlated with each other through preference shocks; for example, the impact of illness on preference may result in a decline in not only consumption, but also working hours. We will carefully treat this potential relation between household consumption and leisure (working hours) in interpreting the estimation results.

Fifth, what is more fundamental for our research, the rejection of $\beta_1 = 1$ and $\beta_2 = 0$ does not necessarily imply that idiosyncratic shocks are never insured among households. A problem with one of our maintained assumptions is potentially responsible for the failure of the full insurance hypothesis under the above specification. First, once subsistence levels are considered as in Atkeson and Ogaki [1996] and Ogaki and Zhang [2001], equations (4) and (5) usually fail to hold; consequently, the coefficient on household income may not be zero even under the full insurance hypothesis. Second, the heterogeneity in belief or risk aversion among consumers again forces $\beta_1 = 1$ and $\beta_2 = 0$ to be rejected even with the full insurance. Finally, when not full, but partial risk sharing arises due to asymmetric information in contracting insurance, the estimation result may indicate that β_1 is significantly less than one, but still close to one; similarly, β_2 may be significantly greater than zero, but still close to zero.

Motivated by the above-mentioned possibilities, we are interested in not only whether the full insurance hypothesis is accepted, but also to which extent it holds. For this purpose, we will compare carefully our empirical results with those based on US micro data in order to see how the extent of risk sharing differ between the two countries. In addition, we examine how the estimation results differ among subcategories of the consumption.

3.3. **Estimation results** The first panel (Panel A) of Table 3 reports the empirical results for one-month changes based on the first difference specification (6). As the F-test statistic clearly shows, the full insurance hypothesis is rejected strongly for most of the expenditure categories. For all items, household income has a statistically significant positive impact on the individual consumption pattern, even with the inclusion of the per capita aggregate consumption. The empirical results suggest that the full insurance hypothesis is not rejected for expenditure on housing. The durable nature of expenditure on housing may be responsible for this empirical result.

The above pattern of the rejection for the full insurance hypothesis is fairly robust with respect to alternative specifications. As shown in the second panel (Panel B), this pattern holds for the case of five-month changes. The full insurance implication is rejected strongly for most items. While it is supported for expenditure on education as well as housing, the results may again reflect the durable nature of these expenditures. As Table 4 reports, the rejection pattern is still observed when the growth specification (7) is adopted, instead of the first difference specification for one-month changes. The full insurance implication is again rejected strongly for all of the expenditure categories.

Table 5 reports the results for the specification including dummy variables for changes in employment status among household members. In the empirical model to be estimated, the variable associated with the coefficient accounting for change in employment status is the variable that takes the value of one when a household member becomes employed for one month, minus one when a member becomes unemployed during the period, and zero otherwise[6]. The empirical results again indicate that the full insurance hypothesis is rejected.

A closer look at the estimation results reported by Table 4 (the growth specification), however, indicates that how they deviate from the full insurance differs among subcategories of the consumption, while the full insurance hypothesis is strongly rejected for all items. In particular, the sensitivity to household income is much smaller for the expenditures on food (0.02), housing (0.02), utilities (0.01), and medical care[7] (0.02) than those on other items; for reference, it is 0.06 for the total consumption. These results suggest that idiosyncratic shocks are insured relatively well for the consumption of necessities.

We make several comments on the interpretation of the above empirical results. First, as discussed before, consumption may be correlated with leisure (working hours) through either the inseparability between consumption and leisure, or preference shocks. Such a correlation may yield positive coefficients on household income in equations (6) and (7) even under the full insurance hypothesis. In principle, such problems should be treated by a proper choice of instrumental variables.

The above correlation problem, however, may be handled properly, when we use as a sample set only households whose head is employed. For such a household sample with employed heads only, household leisure or working hours does not change substantially over time; consequently, the length of leisure (working hours) is controlled to some extent. In particular, if the household labor income is replaced by the employment status (working

[6]Note that household heads are always employed or self-employed in our data set.

[7]The medical expenditure here does not include that covered by the National Health Insurance system. Therefore, the effect of the public insurance is not reflected in the estimation results reported by this paper.

or not) among household members in the empirical specification, the problem associated with correlation becomes even less serious. Among most households, the intertemporal change in the employment status is caused by that of a spouse. Accordingly, changes in the employment status tends to reflect the choice of a spouse between market activity and household production, not between working hours and leisure. Therefore, the length of household leisure (working hours) is controlled as almost constant. Although the estimation result is not reported in this paper, we find that the full insurance hypothesis is still rejected strongly for the case where the family employment status is used as a regressor with the sample that consists of only households with employed heads.

Second, if consumption is inseparable in time, as for durables, the absence of lagged consumption in the specification may result in a correlation between the error term and the labor income term. Because the durability becomes weaker as time increases, such a correlation can be controlled if first differences (growth rates) are defined with a longer interval. As is shown in Panel A and B of Table 3, the empirical results, based on five-month changes (growth), do not differ substantially from those based on one-month changes (growth). Thus, the empirical results available from the basic specification are robust with respect to alternative specifications, and neither non-separability between consumption and leisure nor time-non-separability is responsible for rejecting the full insurance hypothesis.

Even for the extended cases, presented in the following subsections, the empirical results are again fairly robust with respect to alternative specifications. In what follows, therefore, we report only the results for the growth specification with one-month changes[8]. One major advantage of using data with one-month growth is that its sample size is rather large relative to the case of five-month growth.

3.4. **Comparison with US cases** As suggested before, to what extent risk sharing works among households is a fairly important question in our context. To explore such relative implications about risk sharing, we compare our estimation results with those based on US household panel data. Hereafter, we make a comparison based on the growth specification.

[8] The results based on alternative specifications are available from the authors upon request.

In terms of the total consumption, the sensitivity to household income (β_2) is fairly similar between the two countries. While it is 0.06 in our case (see Table 4), those based on US data indicate that the sensitivity is 0.04 in Mace [1991], 0.05 in Cochrane [1991], and 0.05 in Nelson [1994]. Given that our sample is much larger than theirs, our estimation obtains more precise estimates for the sensitivity.

Looking at Mace [1991] more closely, we compare the estimation results item by item. In Mace [1991], the sensitivity to household income is not significantly different from zero for the expenditures on housing (0.01), utilities (0.002), household furnishings (-0.004), and medical care (0.02), implying that idiosyncratic shocks are well insured for the consumption of these items. As discussed in the previous subsection, the pattern observed in Mace [1991] is very similar to that of our estimation results. That is, although the sensitivity is significantly positive for all items, it is much smaller for the expenditures on food, housing, utilities, and medical care, than for other subcategories of the consumption.

The above comparison suggests that the extent and pattern of risk sharing among households do not differ substantially between the two countries.

3.5. **Disaster shocks** The basic empirical specification is extended in two directions. The first extension incorporates the effect of the Hyogo Earthquake, which had a destructive impact on large areas of Hyogo prefecture in January 1995. Catastrophe events such as the Hyogo Earthquake obviously include non-diversifiable or aggregate components[9]. Therefore, the issue we should tackle here is to examine whether such an aggregate shock is shared well between the damaged area and the non-damaged region, or borne largely by the damaged area. As far as markets are complete with respect to aggregate events, we still expect the equality of consumption growth among households under our setup with homogeneous preferences and belief[10].

To explore the above implication, we construct a regional dummy variable Dis, which takes one if a household lives in the damaged cities including Itami, Kobe, and Nishinomiya, all of which are in Hyogo prefecture, and zero otherwise. Replacing the coefficient on the

[9] According to Jorion [1996], the Nikkei stock index fell by 6.4% in the week following the Hyogo Earthquake. Therefore, the Hyogo Earthquake can be regarded as an aggregate event.

[10] Braun, Todd, and Wallace [2000] show that the allocation and pricing of such catastrophe risks depend on properties of preferences, individual assessments of the likelihood of catastrophe events, and so on.

household income β_2 in the previous growth specification by $\beta_2 + \beta_3 Dis$, we specify the empirical model as

$$\ln \frac{C_{t+1}^i}{C_t^i} = \alpha + \beta_1 \ln \frac{C_{t+1}^a}{C_t^a} + (\beta_2 + \beta_3 Dis) \ln \frac{y_{t+1}^i}{y_t^i} + \epsilon_{t+1}^i. \quad (8)$$

The coefficient β_3 is expected to represent the degree to which the earthquake shock is allocated between the disaster area and the non-disaster region. Finding $\beta_3 = 0$ suggests that the earthquake shock was effectively insured throughout the national economy by way of either the insurance markets, family insurance, self-insurance, or governmental help. Positive β_3, on the other hand, indicates that the earthquake shock was borne largely by the Hyogo area.

One subtle issue concerning the interpretation of β_3 is that this coefficient is also subject to the region-specific insurance availability. As found in Kohara [2001], the insurance availability is generically better in urban areas than in rural areas. Since the damaged area is urban, the coefficient β_3 reflects not only the insurance capability specific to the earthquake shock, but also specific to this urban area. To control for the two different kinds of the insurance capabilities, we split the full sample into three sub-samples: (i) the earthquake period, which includes January 1995, in defining growth rates for both consumption and income; (ii) the pre-earthquake period; and (iii) the post-earthquake period. We are also interested in the F-test for testing $\beta_2 + \beta_3 = 0$, to examine whether the perfect sharing of the earthquake shock works in the national economy.

Table 6 reports the empirical results based on the growth specification (8) using one-month changes for the earthquake period. The F-test for both $\beta_1 = 1$ and $\beta_2 + \beta_3 = 0$ indicates that the perfect risk sharing implication is rejected for the total consumption, as well as for several expenditure categories. While this F-test is not significant for some expenditure categories, such as housing, utilities, medical expenses, transportation, education, and recreation, a closer look at the estimated coefficient β_3 indicates that β_3 is significantly positive, and that the households in the damaged area indeed suffered seriously from the earthquake shock.

The empirical results for the pre-earthquake period further highlights the above interpretation. As Table 7 shows[11], the estimated β_3 is negative for most items, thereby suggesting that the damaged area originally enjoyed better insurance capability. It implies that the households in the damaged area failed to spread the earthquake shock to other regions, despite the regional advantage of the insurance availability. In other words, the damage of the earthquake shock overwhelmed the insurance capability specific to this region.

Before concluding this subsection, we point out one data problem with the above estimation. As mentioned above, as a result of the earthquake, the FIES failed to interview a substantial portion of the sample households living in the damaged area. About three quarters of the households in the earthquake area were out of the sample in January 1995. Considering this issue quite seriously, the above empirical results may undermine the impact of the earthquake shock because the FIES might have been forced to drop the households severely affected by the earthquake from the sample.

3.6. **Region-specific shocks** Another extension is to design the empirical specification to test whether household-specific shocks are insured among regions or within a region. For this purpose, we replace the national average aggregate consumption C_t^a in both (6) and (7) by the regional average of consumption C_t^R. We divide the whole region into ten areas, Hokkaido, Tohoku, Kanto, Hokuriku, Tokai, Kinki, Chugoku, Shikoku, Kyushu, and Okinawa. If household-specific shocks are insured among regions, then the basic equation, based on the national average, is correctly specified, but the extension, based on the regional average, is a proper specification for the case of regional risk sharing.

Table 8 reports the empirical results using the above specification with one-month growth rates. A careful comparison with Table 4 suggests that the results, based on the extended specification, are basically the same as those for the basic specification. It follows from this comparison that household-specific shocks are not insured effectively either within a region or among regions.

[11] The empirical results for the post-earthquake period are quite similar to those for the pre-earthquake period. Hence, we do not report the post-earthquake results in this manuscript.

4. Conclusion In this paper, we examine the full insurance hypothesis using the Family Income and Expenditure Survey data, from 1989 to 1997, whose panel data structure has never been exploited seriously for testing the full insurance hypothesis. The overall empirical results suggest that the full insurance hypothesis is strongly rejected for most items of consumption expenditures.

A closer look at the estimation results, however, indicates that households succeed to buffer themselves against a large fraction of the idiosyncratic shocks that they experience, in particular for the consumption of necessities. In addition, we find that the extent and pattern of risk sharing among households do not differ substantially between Japan and the US.

Our empirical investigation has also exploited the Hyogo Earthquake, which took place during the sample period, to examine the insurance capability for such a huge disaster shock. The empirical results clearly indicate that the earthquake shock was not spread from the damaged area to the non-damaged region, despite the fact that the insurance capability in this damaged region was above the national average. As mentioned before, due to the sample attrition problems caused by the earthquake, our empirical results are fairly likely to undermine the impact of the earthquake damage.

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Table 1: Averages and Standard Deviations of Consumption and Income

	A: one month changes			B: five month changes		
	Level (Yen)	Difference (Yen)	Log Difference	Level (Yen)	Difference (Yen)	Log Difference
Total consumption	356530.49	-2615.43	-0.007	369393.18	-2698.58	-0.019
	(24119.67)	(29497.86)	(0.045)	(26321.27)	(32542.18)	(0.052)
Services	132802.88	-729.26	-0.010	139744.70	1879.22	-0.009
	(14387.47)	(18240.74)	(0.068)	(16108.09)	(20108.37)	(0.079)
Nondurables	126101.27	-333.58	-0.003	129643.07	-1522.37	-0.013
	(4571.27)	(4256.61)	(0.029)	(4746.84)	(4971.22)	(0.036)
Durables	31059.96	-1145.24	-0.018	31815.36	-687.57	-0.063
	(1335.36)	(19006.28)	(0.202)	(14381.93)	(19554.34)	(0.212)
Food	84164.49	-396.84	-0.005	86422.87	-1636.88	-0.021
	(3071.39)	(2362.45)	(0.027)	(3236.22)	(3137.66)	(0.036)
Housing	24419.15	499.10	-0.003	26561.29	1600.30	0.019
	(8554.40)	(12029.41)	(0.117)	(10650.98)	(13266.74)	(0.146)
Utilities	20143.89	71.55	0.008	21147.63	855.84	0.051
	(1017.74)	(1115.19)	(0.059)	(1108.30)	(1337.57)	(0.067)
Furniture	16039.27	-312.58	-0.009	16197.81	-915.15	-0.037
	(3832.46)	(5270.74)	(0.128)	(4279.54)	(5956.48)	(0.136)
Clothes	23505.28	-271.73	-0.011	23946.68	-1309.17	-0.067
	(3613.64)	(4754.94)	(0.127)	(4101.67)	(5452.04)	(0.137)
Medical	11539.94	159.85	-0.010	12098.22	264.06	-0.048
Expenses	(2407.74)	(3213.09)	(0.118)	(2986.41)	(3845.78)	(0.135)
Transportation	43743.27	-1263.75	-0.013	45383.93	313.38	-0.016
	(13721.83)	(19526.98)	(0.100)	(14793.61)	(19965.79)	(0.114)
Education	20278.80	152.50	-0.001	22607.49	3392.95	0.064
	(6245.58)	(9919.35)	(0.111)	(6963.02)	(10600.90)	(0.129)
Recreation	38075.14	-476.97	-0.015	39397.87	-1390.23	-0.029
	(5257.91)	(6768.83)	(0.097)	(5143.37)	(7076.99)	(0.108)
Others	74621.27	-419.85	-0.016	75629.39	-1605.69	-0.068
	(9415.99)	(11270.79)	(0.084)	(9446.91)	(12079.18)	(0.101)
Disposable income	592599.47	3112.11	0.004	615197.85	22193.08	0.030
	(40536.15)	(50941.20)	(0.070)	(43531.53)	(53858.27)	(0.069)

(1) The disposable income is defined in terms of the sum of labor income, personal business income, property income and social security benefits.
(2) Standard deviations are in parentheses.

Table 2: Average Monthly Changes in Major Items of Consumption Expenditures in 1997
(in thousands of 1997 yen for a difference in consumption)

	Dec. 96-Jan. 97	January-February	February-March	March-April	April-May	May-June	June-July	July-August	August-September	September-October	October-November	November-December
Total Consumption												
Difference	-124.4	-18.1	75.0	-51.0	-37.7	10.9	41.2	-34.4	-30.3	9.2	-29.7	111.5
	(41.7)	(30.0)	(36.2)	(43.8)	(35.1)	(32.1)	(37.5)	(40.5)	(39.5)	(37.6)	(33.1)	(33.6)
Log Difference	-0.31	-0.07	0.18	-0.13	-0.04	-0.01	0.09	-0.06	-0.09	0.02	-0.05	0.28
	(0.06)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
Services												
Difference	-21.1	-10.6	22.3	1.0	-21.5	0.0	22.9	-4.7	-7.4	5.2	-20.0	22.2
	(28.5)	(21.7)	(20.6)	(28.0)	(23.4)	(21.5)	(27.3)	(18.1)	(21.1)	(25.8)	(23.7)	(21.8)
Log Difference	-0.16	-0.11	0.17	-0.04	-0.06	-0.06	0.11	0.00	-0.10	0.01	-0.07	0.15
	(0.09)	(0.09)	(0.08)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.09)	(0.08)	(0.08)
Nondurables												
Difference	-47.3	-0.1	16.1	-14.1	3.0	-5.5	5.1	0.4	-7.7	0.7	-2.9	44.4
	(5.7)	(3.7)	(4.4)	(4.6)	(3.8)	(4.0)	(4.0)	(4.6)	(3.9)	(3.9)	(3.9)	(5.6)
Log Difference	-0.33	0.00	0.12	-0.11	0.02	-0.05	0.04	0.01	-0.07	0.00	-0.02	0.30
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Durables												
Difference	-24.5	3.2	20.0	-22.5	-16.4	6.4	7.6	-7.8	-11.5	-4.4	-6.3	8.6
	(23.5)	(19.5)	(25.4)	(30.6)	(21.8)	(21.2)	(21.1)	(32.1)	(30.1)	(24.4)	(19.6)	(18.2)
Log Difference	-0.75	-0.17	0.48	-0.54	-0.03	0.09	0.17	-0.13	-0.28	0.05	0.07	0.45
	(0.26)	(0.25)	(0.26)	(0.26)	(0.24)	(0.24)	(0.26)	(0.27)	(0.25)	(0.25)	(0.24)	(0.24)
Food												
Difference	-29.7	0.1	10.2	-6.6	5.3	-3.7	1.2	2.0	-5.7	2.6	-3.5	21.8
	(3.5)	(2.1)	(2.3)	(2.5)	(2.3)	(2.2)	(2.2)	(2.5)	(2.5)	(2.5)	(2.5)	(3.2)
Log Difference	-0.33	0.00	0.12	-0.08	0.06	-0.05	0.01	0.02	-0.07	0.03	-0.04	0.23
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)

(1) Standard deviations are in parentheses.

Table 3 The Estimation Result for a Test of the Full Insurance Hypothesis

Panel A: based on the one-month first-difference specification

Dependent Variables (Classified Items)	Coefficient on ΔC^a_t (β_1)	Coefficient on Δy^i_t (β_2)	F-statistics for β_1=1, β_2=0	R-squared	Number of observations (in thousands)
Total consumption	0.7548*** (0.0114)	0.0530*** (0.0013)	878.24***	0.0430	273
Services	0.8560*** (0.0269)	0.0103*** (0.0007)	96.40***	0.0066	273
Nondurables	0.8868*** (0.0043)	0.0083*** (0.0002)	1228.93***	0.2220	273
Durables	0.8790*** (0.0367)	0.0064*** (0.0008)	33.84***	0.0035	273
Food	0.9214*** (0.0041)	0.0033*** (0.0001)	670.99***	0.2307	273
Housing	0.9581*** (0.0600)	0.0016* (0.0008)	2.31	0.0025	126
Utilities	1.0003*** (0.0136)	0.0001** (0.0000)	5.22**	0.0204	261
Furniture	0.9015*** (0.0251)	0.0019*** (0.0002)	1033.34***	0.0076	270
Clothes	0.9078*** (0.0161)	0.0031*** (0.0002)	123.02***	0.0184	250
Medical Expenses	0.8806*** (0.0493)	0.0008*** (0.0001)	15.54***	0.0022	248
Transportation	0.9210*** (0.0419)	0.0047*** (0.0008)	18.03***	0.0025	269
Education	1.0025*** (0.0279)	0.0018** (0.0006)	5.06**	0.0108	118
Recreation	0.8240*** (0.0187)	0.0058*** (0.0003)	205.98***	0.0147	271
Others	0.5664*** (0.0142)	0.0276*** (0.0005)	1530.53***	0.0361	271

(1) Standard errors are in parentheses.
(2) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Table 3 – Panel B: based on the five-month first-difference specification

Dependent Variables (Classified Items)	Coefficient on ΔC^a_t (β_1)	Coefficient on Δy^i_t (β_2)	F-statistics for β_1=1, β_2=0	R-squared	Number of observations
Total consumption	0.5441*** (0.0368)	0.0966*** (0.0036)	522.22***	0.0466	33891
Services	0.8224*** (0.0564)	0.0260*** (0.0021)	77.99***	0.0143	33891
Nondurables	0.7440*** (0.0167)	0.0164*** (0.0014)	467.36***	0.1447	33891
Durables	0.9083*** (0.0752)	0.0120*** (0.0020)	17.73***	0.0064	33891
Food	0.7246*** (0.0202)	0.0092*** (0.0004)	343.93***	0.1065	33891
Housing	0.9747*** (0.0724)	0.0047* (0.0021)	2.44	0.0129	15394
Utilities	1.0007*** (0.0146)	0.0011*** (0.0001)	36.09***	0.1275	32574
Furniture	0.8815*** (0.0640)	0.0043*** (0.0006)	23.67***	0.0091	33625
Clothes	0.8702*** (0.0407)	0.0066*** (0.0006)	66.27***	0.0243	31612
Medical Expenses	0.8954*** (0.0845)	0.0016*** (0.0004)	6.82**	0.0053	31632
Transportation	0.9245*** (0.0746)	0.0120*** (0.0020)	17.11***	0.0064	33591
Education	1.0048*** (0.0507)	0.0024 (0.0017)	1.04	0.0268	14290
Recreation	0.8102*** (0.0465)	0.0092*** (0.0008)	74.97***	0.0195	33736
Others	0.4689*** (0.0423)	0.0364*** (0.0013)	364.96***	0.0409	33808

(1) Standard errors are in parentheses.
(2) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Table 4: The Estimation Result for a Test of the Full Insurance Hypothesis Based on the One-month Growth-Rate Specification

Dependent Variables (Classified Items)	Coefficient on ΔC^a_t (β_1)	Coefficient on Δy^i_t (β_2)	F-statistics for β_1=1, β_2=0	R-squared	Number of observations (in thousands)
Total consumption	0.8668*** (0.0065)	0.0604*** (0.0013)	1110.24***	0.1032	273
Services	0.9117*** (0.0145)	0.0381*** (0.0019)	190.76***	0.0204	273
Nondurables	0.9329*** (0.0039)	0.0290*** (0.0008)	701.70***	0.2319	273
Durables	0.9295*** (0.0137)	0.0773*** (0.0059)	84.60***	0.0234	273
Food	0.9461*** (0.0043)	0.0210*** (0.0007)	398.26***	0.2012	273
Housing	0.9241*** (0.0515)	0.0216*** (0.0057)	7.23***	0.0036	126
Utilities	1.0010*** (0.0152)	0.0099*** (0.0016)	18.19***	0.0164	261
Furniture	0.9553*** (0.0101)	0.0397*** (0.0038)	54.59***	0.0431	270
Clothes	0.9545*** (0.0099)	0.0585*** (0.0038)	120.22***	0.0436	250
Medical Expenses	0.9398*** (0.0266)	0.0227*** (0.0036)	19.63***	0.0067	248
Transportation	0.9613*** (0.0164)	0.0352*** (0.0028)	80.84***	0.0147	269
Education	1.0101*** (0.0229)	0.0367*** (0.0056)	21.33***	0.0163	118
Recreation	0.9228*** (0.0100)	0.0541*** (0.0028)	181.74***	0.0434	271
Others	0.8237*** (0.0083)	0.1232*** (0.0025)	1245.23***	0.0701	271

(1) Standard errors are in parentheses.
(2) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Table 5: The Estimation Result for a Test of the Full Insurance Hypothesis Using Changes in Employment Status (One-month Growth-Rate Specification)

Dependent Variables (Classified Items)	F-statistics for zero coefficients on employment status	R-squared	Number of observations (in thousands)
Total consumption	16.7710***	0.0962	273
Services	8.4754***	0.0192	273
Nondurables	62.7309***	0.2291	273
Durables	2.3930*	0.0228	273
Food	81.7144***	0.2005	273
Housing	2.3914*	0.0036	126
Utilities	14.0553***	0.0166	261
Furniture	6.0982***	0.0428	270
Clothes	6.7219***	0.0428	250
Medical Expenses	9.6472***	0.0067	248
Transportation	1.7278*	0.0142	269
Education	2.4273**	0.0161	118
Recreation	3.5842***	0.0421	271
Others	29.7344***	0.0622	271

(1) In the second column, our null hypothesis is that the coefficient on aggregate consumption (β_1) equals 1, while that on any of the changes in employment status equals 0.
(2) Standard errors are in parentheses.
(3) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Table 6: The Estimation Result for a Test of the Full Insurance Hypothesis with Disaster Dummies for the Earthquake Period (One-month Growth-Rate Specification)

Dependent Variables (Classified Items)	Coefficient on ΔC^a_t (β_1)	Coefficient on Δy^i_t (β_2)	Coefficient on Dis$\times\Delta y^i_t$ (β_3)	F-statistics For β_1=1, $\beta_2+\beta_3$=0	R-squared	Number of observations
Total consumption	0.7690*** (0.0563)	0.0588*** (0.0091)	0.2611*** (0.0653)	18.65***	0.0908	5540
Services	0.6532*** (0.2286)	0.0353* (0.0150)	0.1964 (0.1073)	3.19*	0.0065	5540
Nondurables	0.8681*** (0.0287)	0.0449*** (0.0063)	0.2341*** (0.0448)	27.43***	0.2643	5540
Durables	0.9641*** (0.1076)	0.0257 (0.0444)	-0.0897 (0.3179)	0.083	0.0234	5540
Food	0.9009*** (0.0314)	0.0308*** (0.0064)	0.2189*** (0.0459)	18.31***	0.2282	5540
Housing	0.3458 (0.4080)	0.1111** (0.0425)	-0.1976 (0.2947)	1.39	0.0057	2435
Utilities	1.1015*** (0.3295)	0.0093 (0.0142)	-0.1613 (0.1019)	1.22	0.0027	5356
Furniture	0.8572*** (0.0743)	0.0877** (0.0294)	0.4883** (0.2091)	5.17**	0.0514	5461
Clothes	0.9866* (0.3940)	-0.0076 (0.0323)	0.7255** (0.2382)	4.57**	0.0154	4979
Medical Expenses	1.0233 (0.7939)	-0.0056 (0.0277)	0.4153* (0.2050)	2.02	0.0007	5135
Transportation	0.2439 (0.4287)	0.0614** (0.0216)	0.1250 (0.1566)	2.08	0.0027	5448
Education	0.9955* (0.3876)	0.0026 (0.0445)	-0.3490 (0.3115)	0.62	0.0041	2371
Recreation	0.9775*** (0.0713)	0.0079 (0.0220)	0.2895 (0.1573)	1.80	0.0533	5488
Others	0.3407*** (0.1258)	0.1630*** (0.0193)	0.3593** (0.1380)	19.15***	0.0312	5509

(1) Standard errors are in parentheses.
(2) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Table 7: The Estimation Result for a Test of the Full Insurance Hypothesis with Disaster Dummies for the Pre-Earthquake Period (One-month Growth-Rate Specification)

Dependent Variables (Classified Items)	Coefficient on ΔC^a_t (β_1)	Coefficient on Δy^i_t (β_2)	Coefficient on Dis$\times\Delta y^i_t$ (β_3)	F-statistics for β_1=1, $\beta_2+\beta_3$=0	R-squared	Number of observations (in thousands)
Total consumption	0.8695*** (0.0077)	0.0606*** (0.0016)	-0.0094 (0.0074)	158.11***	0.1129	177
Services	0.8936*** (0.0173)	0.0432*** (0.0024)	0.0267* (0.0119)	33.96***	0.0227	177
Nondurables	0.9422*** (0.0047)	0.0269*** (0.0010)	-0.0258*** (0.0045)	77.00***	0.2481	177
Durables	0.9363*** (0.0182)	0.0654*** (0.0073)	-0.0575 (0.0348)	6.13**	0.0203	177
Food	0.9553*** (0.0051)	0.0178*** (0.0009)	-0.0034 (0.0043)	41.67***	0.2156	177
Housing	0.9457*** (0.0600)	0.0206** (0.0068)	-0.1164*** (0.0296)	6.17**	0.0042	82
Utilities	0.9985*** (0.0191)	0.0083*** (0.0020)	0.0082 (0.0108)	1.21	0.0161	169
Furniture	0.9720*** (0.0124)	0.0226*** (0.0047)	0.0423 (0.0222)	6.32**	0.0438	175
Clothes	0.9676*** (0.0119)	0.0424*** (0.0047)	-0.0334 (0.0228)	3.74*	0.0461	163
Medical Expenses	0.9037*** (0.0334)	0.0300*** (0.0046)	0.0527* (0.0218)	10.56***	0.0070	160
Transportation	0.9556*** (0.0208)	0.0334*** (0.0035)	0.0093 (0.0178)	5.01**	0.0142	175
Education	1.0051*** (0.0299)	0.0202** (0.0068)	0.0795 (0.0370)	3.76*	0.0142	79
Recreation	0.9274*** (0.0118)	0.0536*** (0.0035)	-0.0008 (0.0168)	22.25***	0.0471	176
Others	0.8241*** (0.0097)	0.1295*** (0.0030)	-0.0601*** (0.0143)	167.43***	0.0768	176

(1) Standard errors are in parentheses.
(2) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Table 8: The Estimation Result for a Test of the Full Insurance Hypothesis with Region-Specific Shocks (One-month Growth-Rate Specification)

Dependent Variables (Classified Items)	Coefficient on ΔC^R_t (β_1)	Coefficient on Δy^i_t (β_2)	F-statistics for β_1=1, β_2=0	R-squared	Number of observations (in thousands)
Total consumption	0.8755*** (0.0063)	0.0588*** (0.0013)	1065.87***	0.1079	273
Services	0.9353*** (0.0124)	0.0368*** (0.0019)	184.02***	0.0266	273
Nondurables	0.9370*** (0.0279)	0.0279*** (0.0008)	656.65***	0.2391	273
Durables	0.9435*** (0.0123)	0.0740*** (0.0058)	80.12***	0.0279	273
Food	0.9489*** (0.0042)	0.0205*** (0.0007)	383.87***	0.2077	273
Housing	0.9853*** (0.0228)	0.0182*** (0.0053)	5.88**	0.0157	126
Utilities	1.0007*** (0.0126)	0.0099*** (0.0016)	18.41***	0.0239	261
Furniture	0.9614*** (0.0093)	0.0389*** (0.0037)	53.76***	0.0488	270
Clothes	0.9609*** (0.0092)	0.0574*** (0.0037)	117.93***	0.0498	250
Medical Expenses	0.9690*** (0.0189)	0.0215*** (0.0035)	18.92***	0.0121	248
Transportation	0.9739*** (0.0134)	0.0344*** (0.0027)	78.47***	0.0213	269
Education	1.0047*** (0.0166)	0.0349*** (0.0056)	19.67***	0.0302	118
Recreation	0.9339*** (0.0092)	0.0527*** (0.0028)	117.88***	0.0492	271
Others	0.8421*** (0.0078)	0.1190*** (0.0024)	1183.23***	0.0756	271

(1) Standard errors are in parentheses.
(2) ***, **, and * indicate that the estimated coefficient is significant at the 0.1 percent, 1 percent and 5 percent levels respectively.

Data Appendix: Thirteen Items of Consumption Expenditures

Classified Items	Classification : "the *FIES* Classification Name" [Classification Code]
Food	"food"[1]
Housing	"housing"[2]
Utilities	"heating and water"[3]
Furniture	"furniture and household goods"[4]
Clothes	"clothes and footwear"[5]
Medical Expenses	"medical expenses"[6]
Transportation	"transportation and communication"[7]
Education	"education"[8]
Recreation	"recreation"[9]
Others	"others"[10] (excluding "entertainment expenses"[10.3] and "transfers to family members and others"[10.4])
Services	"eating out"[1.12] + "rent"[2.1] + "housing repairs and maintenance services"[2.2.2] + "household services"[4.6] + "services related to clothes"[5.8] + "medical services"[6.4] + "transportation"[7.1] + "automobile maintenance"[7.2.3] + "communication"[7.3] + "tuition"[8.1] + "supplementary education[8.3] + "recreational services"[9.4] + "services related to beauty"[10.1.1] + "other miscellaneous goods"[10.1.5] + "recreation included in entertainment expenses"[10.3.4] + "services included in entertainment expenses[10.3.5]
Nondurables	Food (excluding "eating out"[1.12]) + Utilities + "household nondurables"[4.5] + Clothes (excluding "services related to clothes"[5.8]) + Medical Expenses (excluding "medical equipment"[6.3] and "medical services"[6.4]) + "textbooks and educational materials"[8.2] + "recreational equipment"[9.2] + "books and other printed matters"[9.3] + "beauty aids"[10.1.2] + "cigarettes"[10.1.4] + "food included in entertainment expenses"[10.3.1] + "other entertainment expenses"[10.3.7]
Durables	"materials for housing repairs and maintenance"[2.2.1] + "household durables"[4.1] +"room ornaments"[4.2] +"medical equipment"[6.3] + "automobiles"[7.2.1] + "bicycles"[7.2.2] + "recreational durables"[9.1] + "furniture and household goods included in entertainment expenses"[10.3.2]

(1) See *the Report on the Family Income and Expenditure Survey* for more details on the above classification codes.