The Characteristics of Public and Private Life Insurance Demand in Japan

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Abstract:

The purpose of this study is to estimate the demand for Japanese life insurance products. When considering Japanese life insurance demand, we have to examine not only 'private' life insurance products but also 'public' life insurance products. These public life insurance products have several characteristics. Given these characteristics, these public life insurance products are called 'Kan'ihoken' or 'Kampo' for short, which means they cost little and are easy to purchase.

We estimated both private and public life insurance demand equations by using household-level data, which record only purchasing intentions about life insurance products. We classified all households into four groups: households that had already purchased only Kampo (Group 1); households that had already purchased only private life insurance product (Group 2); households that had already purchased private and public life insurance products (Group 3); and households that had no life insurance product (Group 4). The main aim of this classification is to find the factors that characterize each group.

We derive the following main conclusions. The (objective) savings-related variables are the factors that characterize each group. Households in Group 1 decided whether to purchase additional life insurance products regardless of the (objective) savings-related variables. Households in Group 2 tended to purchase additional life insurance products when their savings were low. Households in Group 3 tended to purchase additional life insurance products when they had high savings. Households in Group 4 tended to purchase life insurance products when they had either relatively low or very high savings.

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1. Introduction

The analysis of life insurance demand is both traditional and new. Many researchers have already estimated life insurance demand in Japan. For example, Tachibanaki and Shimono (1994), Urata et al. (1999) and Komamura et al. (2001) have investigated the relationships between life insurance demand and factors such as household income, age, working patterns and the number of children in order to shed light on the demand structure of life insurance products in Japan.

However, the problem is new because life insurance demand changes in every year in every country (or region) in relation to exogenous conditions such as the number of life insurance firms and the level of regulation. For example, life insurance demand in a regulated life insurance market may differ from that in a deregulated market. Thus, new research is needed when exogenous conditions change.

The purpose of this study is to estimate the demand for Japanese life insurance products. When considering Japanese life insurance demand, we have to examine not only 'private' life insurance products but also 'public' life insurance products. These public life insurance products are sold by Japan Post that is public corporation in which Japanese government is investing 100 percent. These life insurance products have particular characteristics. For example, their insurance money is relatively small (at 10 million yen or about 84,700 U.S. dollars) and households can purchase them without pre-underwriting. Given these characteristics, these public life insurance products are called 'Kan'ihoken' or 'Kampo' for short, which means they cost little and are easy to purchase. However, the scale of Kampo is large. According to the annual report for fiscal 2005, the total assets of Kampo amounted to about 121 trillion yen (or about 1.07 trillion U.S. dollars).[1] Thus, it is reasonable to suppose that Kampo is an important factor for estimating Japanese life insurance demand.

However, the impact of the existence of public life insurance products is unclear because few researchers have investigated both private and public life insurance products. Although Tachibanaki (1986), Kohara (2001) and Purcal and Piggott (2004) have investigated Japanese public life insurance, they merely mentioned Kampo and did not characterize its features thoroughly

Furthermore, their research did not reflect recent changes in Kampo. For example, Japan Post changed its organizational form in 2003 and in 2006 in order to move from the public sector to the private sector. In 2004, Japan Post started selling whole life insurance

[1] See http://www.japanpost.jp/top/disclosure/e2005/index.html

with fixed-term features which is the main product sold by private life insurance firms. In particular, there is little empirical research on Kampo. An exception is the research of Okura and Kasuga (2006). They estimated both private and public life insurance demand in Japan. Furthermore, they estimated life insurance demand for households that purchase multiple life insurance products simultaneously.

However, Okura and Kasuga (2006) did not consider purchasing intentions about life insurance products. Intentions to purchase life insurance products are important factors affecting the demand. Households that do not have purchasing intentions may not purchase life insurance products even if other conditions, such as income and the number of children, favor purchasing. Thus, to estimate life insurance demand more precisely, we need to exclude households that have no purchasing intentions. Furthermore, households that have already purchased both or either life insurance product have different demand functions to those households that have never purchased any life insurance products.

In our research, we clarify the differences between private and public life insurance in terms of the savings. Although Okura and Kasuga (2006) used financial factors as explanatory variables, the amount of savings was not included in their estimating equation. Theoretical research (such as that by, for example, Ehrlich and Becker (1972) and Courbage (2001)), suggests relationships between insurance demand and the savings. Thus, the savings may affect the characterization of household life insurance demand.

We reach the following main conclusions. Households that had already purchased only Kampo decided whether to purchase additional life insurance products regardless of (objective) savings-related variables such as the amount of savings and a high-savings dummy. Households that had already purchased only private life insurance product tended to purchase additional life insurance products when their savings were low. Households that had already purchased both life insurance products tended to purchase additional life insurance products when their savings were high. Households that had no life insurance products tended to purchase life insurance products when their savings were relatively low or very high.

The remainder of this article is organized as follows. In Section 2, we introduce the data, describe the estimation method, and explain the dependent and explanatory variables used. The results are presented and interpreted in Section 3. Concluding remarks are presented in Section 4.

2. Estimation of Life Insurance Demand Functions

2.1. The data

In this research, we obtain the results described above by using data collected by the

Postal Services Research Institute. The data were collected using a questionnaire between 11 October and 10 November 2005. The questionnaire contains a broad range of detailed household information and, hence, appropriate data can be obtained from the database. This database contains the data needed to estimate life insurance demand; for example, there is information on private life insurance and Kampo, and purchasing intentions. The number of valid responses was 4,009, which represents a response rate of about 46%. Of these, 3,182 responses were from households with two members or more, and the remaining 827 were from single-person households. Data from households without purchasing intentions were excluded. Through this exclusion, the sample size fell to 3,553.

2.2. Equation used for estimation

In this section, we explain the estimation method used for the life insurance demand function. The respondent either intends to purchase additional life insurance products ($Y = 1$) or does not ($Y = 0$) in each of the four groups. Suppose that $\mathbf{x}$ is a vector of explanatory variables and that $\boldsymbol{\beta}$ is a vector of coefficients. Suppose also that additional purchasing is represented by a linear function. Then, we have the following functional form:

$$\begin{cases} Prob(Y = 1 \mid \mathbf{x}) = F(\mathbf{x}, \boldsymbol{\beta}) \\ Prob(Y = 0 \mid \mathbf{x}) = 1 - F(\mathbf{x}, \boldsymbol{\beta}) \end{cases}.$$

Note that $F(\mathbf{x}, \boldsymbol{\beta}) = \mathbf{x}'\boldsymbol{\beta}$. $E[\mathbf{y} \mid \mathbf{x}]$ can be calculated as follows:

$$E[\mathbf{y} \mid \mathbf{x}] = 0[1 - F(\mathbf{x}, \boldsymbol{\beta})] + 1[F(\mathbf{x}, \boldsymbol{\beta})] = F(\mathbf{x}'\boldsymbol{\beta}).$$

To restrict $\mathbf{x}'\boldsymbol{\beta}$ to the 0–1 interval, we choose the following standard normal distribution, $\phi(t)$:

$$Prob(Y = 1 \mid \mathbf{x}) = \int_{-\infty}^{\mathbf{x}'\boldsymbol{\beta}} \phi(t)dt = \Phi(\mathbf{x}'\boldsymbol{\beta}).$$

In this context, $\Phi(\cdot)$ denotes the standard normal cumulative distribution function. In this study, we apply this probit model to four groups in order to identify the determinants of purchasing activities.

2.3. Dependent variables

We classify each household on which we have information on purchasing intentions into one of the following four groups:

Households that have already purchased only Kampo;
Households that have already purchased only private life insurance product;
Households that have already purchased both life insurance products;
Households that have no life insurance product.

Hereafter, we refer to these groups as Group 1, Group 2, Group 3 and Group 4, respectively. These groups are used to construct dependent variables for estimation.

2.4. Explanatory variables

Based on the previous section, we specify the following explanatory variables: the number of household members; the age of household head; the educational level of the children (preschool, elementary school, junior high school, high school, or university. Note that 'children who earn their own living' is the base case); the amount of income; a high-income dummy (1 if household income is more than 15 million yen (or about 133,000 U.S. dollars), 0 otherwise); amount of savings; a high-savings dummy (1 if household savings are more than 30 million yen (or about 270,000 U.S. dollars), 0 otherwise); the amount of debt; an owner-occupied house dummy (1 if household owns its own house, 0 otherwise); a metropolitan dummy (based on five categories: (1) Tokyo; (2) cities of more than 150,000 residents; (3) cities of less than 150,000 but more than 50,000 residents; (4) cities of less than 50,000 residents; (5) towns and villages. Note that 'government-designated major cities'[2] represents the base case); a dummy variable for provision for sickness and injury (1 if household is aware of sickness and injury, 0 otherwise); a dummy variable for provision for death (1 if household is aware of death, 0 otherwise), a sufficient-savings dummy (1 if household members feel they have sufficient savings, 0 otherwise).

Descriptive statistics are reported in Table 1 and the correlation matrix is in Table 2. Note that the original questionnaire survey used class intervals instead of asking for exact values. Thus, to estimate the demand functions, we transformed class intervals into amounts based on the class average.

---------- Insert Table 1 and Table 2 about here ----------

[2] A government-designated major city is a city where more than 500,000 people live, designated by Japanese government ordinance. There are 15 government-designated major cities in Japan as of June 2006.

3. Results

The results for the life insurance demand function are shown in Table 3.

---------- Insert Table 3 about here ----------

In Group 1, ‘number of household members’ has a significantly positive effect. This result suggests that households want to purchase additional life insurance products for a relatively large number of household members because they only have Kampo, which can cover no more than 10 million yen (or about 84,700 U.S. dollars). The effect of ‘amount of income’ is significantly negative. This result means that the higher household income rises, the lower life insurance demand becomes. Households with high incomes do not want to purchase additional life insurance products because they can cover their risks without these products. The effect of ‘owner-occupied house dummy’ is significantly negative. Households with owner-occupied houses can sell their houses if they need large amounts of money. Thus, they do not need additional life insurance products. The dummy variable for ‘provision for sickness and injury’ has a significantly positive effect. This result seems straightforward. The ‘sufficient-savings’ dummy has a significantly negative effect. This result shows these households prefer saving to increasing coverage by using additional life insurance products.

In Group 2, the effect of ‘age of household head’ is significantly positive. This result seems reasonable because the level of risk strongly depends on the age of the household head. For example, as the household head ages, the probability of death rises. The effect of ‘amount of savings’ is significantly negative. This result indicates that households with relatively low savings cannot cover their risks without additional life insurance products. The effects of the dummy variables for ‘owner-occupied house’, ‘provision for sickness and injury’ and ‘sufficient-savings’ are the same as those reported for Group 1, so no further explanation is required.

In Group 3, the effect of ‘number of household members’ is the same as that in Group 1. The effect of ‘amount of income’ is significantly negative. This result suggests that households with high incomes do not want to purchase additional life insurance products because they can cover their risks by using both their incomes and the public and private life insurance products they have already purchased. The effects of ‘amount of savings’ and the dummy for ‘owner-occupied house’ are significantly positive. These results seem counterintuitive because households with high savings and those that have owner-occupied house can cover their risks without purchasing additional life insurance

products. These households may be very sensitive to risk. They obtain more coverage than is reasonably necessary. In contrast, the effects of the dummies for 'provision for death' and 'sufficient-savings' are reasonable because these households want to purchase additional life insurance products to provide some coverage for provision for death rather than save.

In Group 4, 'number of household members' has a significantly negative effect. This is the opposite of the results for Groups 1 and 3. The effect of 'age of household head' is significantly negative, which is the opposite of its effect for Group 2. We can explain these results as follows. According to Fukaya (1974, 1975) and Miyajima (1992), family and insurance coverage are substitutable in terms of risk coverage.[3] Thus, larger households can cover their risks by themselves, and hence they do not need life insurance products. Furthermore, households in Group 4 do not have life insurance products. There are many reasons for this. A persuasive explanation is that because their children work, household heads need not save money for their children. Of course, the older the household heads are, the more likely their children are to be working. Thus, households headed by older people tend not to purchase life insurance products. The effect of 'amount of income' is significantly negative. This result shows that households with low incomes tend to purchase life insurance products because they cannot cover their risks by using only their incomes. The effects of the two (objective) savings-related variables (amount of savings (–) and the high-savings dummy (+)) suggest that households with relatively low or very high savings tend to purchase life insurance products. The result for households with very high savings seems strange. However, we can interpret this result in two ways. One, these households may be rather risk-averse. Two, they may intend to purchase life insurance products not for risk coverage but for tax avoidance; this is feasible because insurance premiums are treated as costs under the Japanese tax system. The effect of the dummy for 'owner-occupied house' is significantly negative, as before. The dummy for 'provision for sickness and injury' has a significantly negative effect. This result suggests that households in Group 4 are unwilling to use life insurance products even if they have to provide coverage for sickness and injury.

4. Concluding Remarks

We estimated both private and public life insurance demand functions by using

[3] Of course, that substitutability also depends on many factors such as the age gap between husband and wife and the ratio of aged members in the household. For details, see Kotlikoff and Spivak (1981) and Fitzgerald (1989).

household-level data on purchasing intentions about life insurance products. We classified all households into four groups: households that have already purchased only Kampo (Group 1); households that have already purchased only private life insurance product (Group 2); households that have already purchased private and public life insurance products (Group 3); households that purchased no life insurance products (Group 4). The main aim of this classification is to identify the factors that characterize each group.

We obtained the following main conclusions. Table 3 clearly shows that (objective) savings-related variables, including the amount of savings and the dummy for high savings, are the factors that characterize each group. Households in Group 1 determine whether to purchase additional life insurance products regardless of their savings. Households in Group 2 tend to purchase additional life insurance products when they have low savings. Households in Group 3 tend to purchase additional life insurance products when they have high savings. Households in Group 4 tend to purchase life insurance products when they have either relatively low or very high savings.

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Table 1　Descriptive Statistics

	Mean	S.D.	Min	Max
Dependent Variables				
Households that have purchasing intention (All)	0.321	0.467	0.000	1.000
Households that have purchasing intention (Group 1)	0.037	0.190	0.000	1.000
Households that have purchasing intention (Group 2)	0.114	0.318	0.000	1.000
Households that have purchasing intention (Group 3)	0.090	0.286	0.000	1.000
Households that have purchasing intention (Group 4)	0.079	0.270	0.000	1.000
Explanatory Variables				
Number of household members	2.983	1.513	1.000	10.000
Age of household head	53.419	14.116	20.000	79.000
Age of household head (Squared)	3052.808	1468.818	400.000	6241.000
Preschool dummy	0.109	0.311	0.000	1.000
Elementary school dummy	0.119	0.324	0.000	1.000
Junior high school dummy	0.085	0.279	0.000	1.000
High school dummy	0.084	0.277	0.000	1.000
University dummy	0.065	0.247	0.000	1.000
Amount of income (logarithmic value)	6.146	0.649	5.075	8.161
High-income dummy	0.026	0.160	0.000	1.000
Amount of savings (logarithmic value)	5.752	2.221	0.000	9.433
High-savings dummy	0.088	0.283	0.000	1.000
Amount of debt (logarithmic value)	2.723	3.244	0.000	8.740
Owner-occupied house dummy	0.721	0.449	0.000	1.000
Tokyo section dummy	0.068	0.252	0.000	1.000
More than 150,000 city dummy	0.327	0.469	0.000	1.000
More than 50,000 city dummy	0.223	0.417	0.000	1.000
Less than 50,000 city dummy	0.056	0.230	0.000	1.000
Towns and villages dummy	0.165	0.372	0.000	1.000
Provision for sickness and injury dummy	0.945	0.229	0.000	1.000
Provision for death dummy	0.892	0.310	0.000	1.000
Sufficient-savings dummy	0.105	0.306	0.000	1.000

Table 2: Correlation Matrix

Explanatory Variables (# of obs. 3553)	Number of household members	Age of household head	Age of household head (Squared)	Preschool dummy	Elementary school dummy	Junior high school dummy	High school dummy	University dummy	Amount of income	High-income dummy	Amount of savings	High-savings dummy	Amount of debt	Owner-occupied house dummy	Tokyo section dummy	More than 150,000 city dummy	More than 50,000 city dummy	Less than 50,000 city dummy	Towns and villages dummy	Provision for sickness and injury dummy	Provision for death dummy	Sufficient-savings dummy
Number of household members	1.0000																					
Age of household head	-0.1124	1.0000																				
Age of household head (Squared)	-0.1534	0.9896	1.0000																			
Preschool dummy	0.2322	-0.4391	-0.4128	1.0000																		
Elementary school dummy	0.3579	-0.3145	-0.3275	0.2682	1.0000																	
Junior high school dummy	0.3237	-0.1710	-0.1985	-0.0483	0.2611	1.0000																
High school dummy	0.3141	-0.1039	-0.1380	-0.0697	0.0330	0.3075	1.0000															
University dummy	0.2444	-0.0310	-0.0631	-0.0811	-0.0723	0.0666	0.2538	1.0000														
Amount of income (logarithmic value)	0.4531	-0.1283	-0.1770	0.0094	0.1230	0.1246	0.1532	0.1736	1.0000													
High-income dummy	0.1288	0.0224	0.0108	-0.0516	-0.0167	-0.0122	-0.0114	0.0569	0.3850	1.0000												
Amount of savings (logarithmic value)	0.0678	0.2096	0.1913	-0.1097	-0.0637	-0.0329	-0.0078	0.0480	0.3496	0.1318	1.0000											
High-savings dummy	0.0080	0.1688	0.1642	-0.0985	-0.0739	-0.0447	-0.0326	-0.0009	0.2019	0.2174	0.3941	1.0000										
Amount of debt (logarithmic value)	0.3130	-0.2281	-0.2610	0.1159	0.2378	0.1845	0.1388	0.1035	0.3018	0.0526	-0.1164	-0.1478	1.0000									
Owner-occupied house dummy	0.2626	0.4061	0.3707	-0.1816	0.0004	0.0622	0.0663	0.0930	0.2149	0.0746	0.2757	0.1285	0.2245	1.0000								
Tokyo section dummy	-0.0458	-0.0521	-0.0441	0.0061	-0.0269	-0.0106	0.0109	-0.0033	0.0805	0.0466	0.0262	0.0190	0.0014	-0.0607	1.0000							
More than 150,000 city dummy	-0.0249	-0.0307	-0.0244	0.0265	-0.0025	-0.0066	0.0033	-0.0257	-0.0315	-0.0241	-0.0188	-0.0164	-0.0082	-0.0805	-0.1885	1.0000						
More than 50,000 city dummy	0.0184	0.0482	0.0466	-0.0396	-0.0199	0.0031	0.0059	0.0175	0.0130	-0.0075	0.0397	0.0418	-0.0148	0.0962	-0.1450	-0.3740	1.0000					
Less than 50,000 city dummy	-0.0006	0.0228	0.0178	-0.0024	0.0049	-0.0086	0.0014	0.0003	-0.0052	0.0291	0.0085	-0.0105	0.0102	0.0453	-0.0659	-0.1698	-0.1307	1.0000				
Towns and villages dummy	0.0640	0.0927	0.0863	-0.0508	-0.0187	-0.0031	-0.0118	-0.0253	-0.0301	-0.0256	-0.0268	-0.0281	-0.0107	0.1339	-0.1204	-0.3104	-0.2389	-0.1085	1.0000			
Provision for sickness and injury dummy	0.0803	-0.0867	-0.0999	0.0253	0.0359	0.0255	0.0289	0.0290	0.1002	-0.0065	0.0622	-0.0468	0.0957	0.0327	-0.0272	-0.0094	0.0001	0.0162	0.0086	1.0000		
Provision for death dummy	0.1716	-0.1165	-0.1283	0.0715	0.0743	0.0734	0.0460	0.0399	0.1466	0.0114	0.0503	-0.0340	0.1334	0.0531	-0.0396	-0.0079	0.0052	0.0095	0.0103	0.4916	1.0000	
Sufficient-savings dummy	-0.0424	0.0959	0.1054	-0.0367	-0.0519	-0.0386	-0.0206	-0.0156	0.0172	0.0706	0.1452	0.2259	-0.0947	0.0614	0.0280	-0.0013	0.0174	0.0007	-0.0162	-0.0377	-0.0327	1.0000

Table 3: Estimation Results

Explanatory Variables	Group 1			Group 2			Group 3			Group 4		
	Coef.	t-value	Prob.	Coef.	t-value	Prob.	Coef.	t-value	Prob.	Coef.	t-value	Prob.
Constant	-1.92	-2.57	***	-2.18	-4.40	***	-2.82	-4.45	***	5.13	8.94	***
Number of household members	0.07	1.79	*	0.03	1.02		0.05	1.99	**	-0.15	-3.55	***
Age of household head	0.01	0.34		0.05	2.94	***	0.03	1.49		-0.11	-6.60	***
Age of household head (squared)	0.00	0.51		0.00	-2.70	***	0.00	-1.13		0.00	6.83	***
Preschool	0.16	0.94		-0.03	-0.25		0.31	2.43	**	-0.01	-0.08	
Elementary school	0.17	1.14		-0.29	-2.73	***	-0.02	-0.14		-0.11	-0.63	
Junior high school	0.10	0.55		-0.02	-0.15		-0.19	-1.46		0.04	0.17	
High school	-0.10	-0.52		-0.14	-1.16		0.10	0.84		-0.05	-0.21	
University	-0.28	-1.18		-0.10	-0.76		-0.06	-0.46		-0.61	-1.41	
Amount of income	-0.17	-1.92	*	-0.04	-0.60		-0.14	-2.13	**	-0.42	-5.20	***
High-income dummy	-0.22	-0.55		-0.41	-1.58		0.12	0.60		0.49	1.27	
Amount of savings	0.00	-0.14		-0.04	-2.93	***	0.08	3.85	***	-0.12	-7.88	***
High-savings dummy	0.03	0.19		-0.05	-0.42		-0.13	-1.03		0.37	2.28	**
Amount of debt	0.00	-0.01		0.02	1.63		0.01	0.91		0.00	0.21	
Owner-occupied house dummy	-0.28	-2.62	***	-0.31	-4.00	***	0.37	3.81	***	-0.38	-4.04	***
Tokyo section	0.44	2.50	**	-0.14	-0.99		0.08	0.59		0.12	0.82	
More than 150,000 city	0.09	0.71		0.03	0.40		-0.11	-1.09		-0.16	-1.55	
More than 50,000 city	0.07	0.48		0.03	0.33		-0.02	-0.16		-0.12	-1.00	
Less than 50,000 city	0.14	0.67		-0.11	-0.77		0.03	0.21		-0.18	-0.99	
Towns and villages	0.08	0.55		0.05	0.46		-0.06	-0.52		-0.28	-2.07	**
Provision for sickness and injury dummy	0.42	1.88	*	0.30	1.83	*	0.11	0.61		-0.29	-2.01	**
Provision for death dummy	-0.14	-1.04		0.08	0.70		0.36	2.60	***	-0.11	-0.91	
Sufficient-savings dummy	-0.61	-3.01	***	-0.39	-3.27	***	-0.44	-3.57	***	-0.14	-1.13	
Log likehihood	-532.781			-1217.92			-1018.03			-729.505		
Number of samples	133			406			320			281		
McFadden R-squared	0.061031			0.035359			0.053392			0.257527		

***: Significant at 1% level

**: Significant at 5% level

**: Significant at 10% level