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Abstract

Exploiting theoretical implications for saving motives under uncertainty proposed by Epstein (1980), this paper empirically examines which motive is more dominant in aggregate household saving in Japan, precautionary savings or savings as waiting options. The former motive is driven by the magnitude of risks, while the latter is promoted by the subsequent resolution of uncertainty. Empirical results indicate that saving behavior since the 1980s is more consistent with precautionary savings; however, estimation results from the behavior during the 1990s offer some evidence in favor of savings as waiting options.

Key words: Precautionary savings, Waiting options, Flexibility, Risks, The resolution of uncertainty.

JEL classification codes: D81, D91, and E21.

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1. Introduction

Savings are determined according to various kinds of motives. In an environment without any uncertainty, on the one hand, savings are made mainly on the basis of intertemporal motives. Such motives are based on not only dynamic optimization within a single generation, but also among different generations. Intertemporal motives are sometimes restricted by liquidity positions or borrowing constraints. In an uncertain environment, on the other hand, precautionary motives are most likely to affect savings. That is, consumers may save in preparation for risky events, thereby transferring current resources over time to stabilize future consumption.

Another saving motive under uncertainty, not explored extensively in existing empirical literature of household behavior, is an option to wait for uncertainty to be resolved. With this motive, savings are regarded as a flexible choice for the future, while consumption is treated as a firm commitment to current expenditures or a perfectly irreversible decision. In a casual argument about saving behavior, such waiting options are often confused with precautionary motives. Suppose that one said that the saving ratio went up in response to growing anxiety about future income. Would this statement imply precautionary savings or savings as a waiting option?

According to Epstein (1980), however, these two motives are rigorously differentiated from each other within a simple three-period framework. Precautionary savings are enhanced by the magnitude of risks, while savings as waiting options are promoted by the extent to which uncertainty is resolved over time. Under the preference with constant relative risk aversion, the former motive is more dominant among consumers with stronger income effects, while the latter is more prominent among those with stronger price effects.

One main reason for little interest in a saving motive as a waiting option in existing literature is that it is rather difficult to capture the latter motive in a multi-period context in a systematic manner, although this motive can be regarded in principle as the effect of expected changes in conditional volatility as the measurement of the subsequent resolution of uncertainty. This analytical difficulty contrasts sharply with the easiness with which precautionary saving motives can be treated as the effect of current levels of conditional volatility.

Given the above analytical difficulty in differentiating these two motives in a dynamic context, this paper attempts to empirically explore broad implications available from the three-period model proposed by Epstein (1980), thereby examining which motive is more dominant in determining the aggregate saving among Japanese households, precautionary motives or waiting options. More concretely, we empirically test how the aggregate saving ratio is responsive to either the magnitude of risks or the subsequent resolution of uncertainty. If estimation results indicate that the saving ratio is increasing in levels of risks, then a precautionary motive is regarded as a dominant factor. On the other hand, a saving motive as a waiting option is considered as a significant factor in the following empirical cases. The saving ratio is increasing when risks are currently increasing and uncertainty is expected to be resolved subsequently. Conversely, the ratio is decreasing when risks are presently decreasing and uncertainty is now being resolved.

This paper is organized as follows. Section 2 briefly reviews a simple model proposed by Epstein (1980), while Section 3 presents empirical specification and estimation results. Section 4 presents our conclusions.

2. Epstein's (1980) model This section briefly reviews a theoretical model constructed by Epstein (1980). There are three periods, time 0, time 1, and time 2. A consumer endowed with $u(c)$ as preference and w_0 as an initial endowment in time 0, allocates consumption c_0, c_1, and c_2 over these three periods. One period investment in time 0 yields a safe net return r, while one period investment in time 1 generates a random net return z, which is a discrete random variable with possible m realizations $\{z_1, z_2, z_3, ..., z_m\}$.

The corresponding unconditional probability vector is defined as $p^T = (p_1, p_2, p_3, ..., p_m)$, where $p_i = \Pr(z = z_i)$.

One important assumption is that the consumer receives a signal y correlated with z in time 1. That is, the arrival of such a signal in time 1 may resolve uncertainty concerning a random return z to some extent. Again, y is a discrete random variable with possible n realizations $\{y_1, y_2, y_3, ..., y_n\}$. The corresponding probability vector is defined as $q^T = (q_1, q_2, q_3, ..., q_n)$, where $q_i = \Pr(y = y_i)$. The conditional probability matrix is denoted as $\Pi = (\pi_{ij})$ where $\pi_{ij} = \Pr(z = z_i | y = y_j)$. Thus, $\Pi q = p$ obtains.

Given the above assumptions, the consumer maximizes the following problem with respect to savings in time 0 and time 1:

$$\max_{x_0} \left[u(w_0 - x_0) + \beta \sum_j q_j \max_{x_1} \left\{ u(rx_0 - x_1) + \beta \sum_i \pi_{ij} u(x_1 z_i) \right\} \right],$$

where x_0 and x_1 are savings in time 0 and time 1, and β is a discount factor. The utility function is specified as

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma}, \text{ for } 0 < \gamma \text{ and } \gamma \neq 1,$$

or

$$u(c) = \ln c, \text{ for } \gamma = 1,$$

where γ denotes the degree of relative risk aversion.

Epstein (1980) defines that a signal y is more informative than y' when every user of a time-1 signal is at least as well off in making a decision based on an observation of y as based on an observation of y'. This definition of the degree of informativeness can be interpreted as the extent to which uncertainty is resolved in terms of expected utility.

In an extreme case where y and z are stochastically independent, a signal y provides no information about z. Another extreme case is that y and z are perfectly correlated with each other; that is, uncertainty is resolved perfectly in time 1.

Using the above framework, Epstein (1980) theoretically explores the effect on a time-0 saving decision (x_0) in two ways. The first experiment is to analyze the impact of the degree of mean-preserving spreading of z on x_0 under the assumption that y provides no information about z. This case corresponds to the saving motive in response to riskiness about z. The second experiment is to examine the effect of the degree of informativeness or resolution of uncertainty on x_0 under the assumption that the degree of riskiness of z is fixed from a time-0 perspective.[1] The second case corresponds to the saving motive in response to informativeness or subsequent resolution of uncertainty. Following the terminology used in the introduction, one may call the former motive a precautionary saving motive, and the latter a saving as an option to wait for uncertainty to be resolved subsequently.

One thing to be noticed concerning the above experiments is that the first experiment explores a precautionary saving motive in the absence of a saving as waiting options, while the second examines an option to wait for uncertainty to be resolved later fixing a precautionary saving motive. Therefore, these experiments never analyze the interaction between the two motives or the coexistence of the two. As Epstein (1980) mentions, the interaction cannot be investigated in an analytical form.

In terms of the first experiment, as Rothschild and Stiglitz (1971) show, if γ is larger than one, then an increase in riskiness or the degree of mean-preserving spreading of z leads to an increase in a time-0 saving (x_0), and vice versa.[2] If γ is exactly equal to one, then a

[1] More precisely, $\Pi q = \Pi' q'$ holds under two different signals y and y'.

[2] One caveat is that qualitative implications for precautionary savings differ noticeably between the saving (ratio) specification and the consumption growth specification. Regardless of the degree of relative risk aversion γ, consumption growth is always increasing in riskiness (often measured in terms of conditional variance), while as discussed above, a qualitative effect of riskiness on saving (ratios) depends on γ. See

time-0 saving is independent of riskiness concerning z. This theoretical result implies that a consumer with strong income effects ($\gamma > 1$) raises savings in response to an increase in riskiness. That is, such a consumer is motivated by precautionary savings.

With respect to the second experiment, on the other hand, Epstein (1980) demonstrates that if γ is less than one, then a time-0 saving is larger when y is more informative, and vice versa. Again, if γ is exactly equal to one, then a time-0 saving is independent of the informativeness of y. This theoretical consequence indicates that a consumer with strong price effects ($\gamma < 1$) raises savings when uncertainty is expected to be resolved subsequently.

According to the above implications, when one motive is analyzed with the other motive fixed under the preference of constant relative risk aversion, precautionary savings and savings as waiting options are differentiated rigorously from each other depending on the magnitude of γ. Only the logarithmic preference is free from these two saving motives. The next section explores such theoretical implications using the aggregate saving data of Japanese households.

3. Empirical specification and estimation results

3.1. **Empirical specification** As mentioned in the introduction, a major obstacle of testing savings as waiting options is that it is extremely difficult to measure precisely the extent that uncertainty is resolved over time, although as discussed in Section 3.2, empirical studies of precautionary savings demonstrate that there are various kinds of indexes of riskiness. Consequently, it would be next to impossible to test implications for savings as waiting options in a structural manner.

This study attempts to test empirically more broad implications for savings as waiting options available from the basic model presented in the previous section. We identify two

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the appendix.

different phases of time-series of risk indexes according to their dynamics, and associate these phases with either the subsequent or current resolution of uncertainty.

More concretely, as mentioned below, most risk indexes tend to exhibit cyclical patterns, and hence the case where risk indexes are currently increasing may be regarded as the situation in which uncertainty will be resolved subsequently, while the case where risk indexes are presently decreasing may be viewed as the situation in which uncertainty is being resolved currently. Then, we consider that a saving motive as waiting options is present (absent), if savings increase (decrease) currently when uncertainty is expected to be resolved subsequently.

According to Figure 1, for example, precautionary saving motives are identical at both points A and B because the magnitude of risk is equal to each other. Saving motives as waiting options, however, differ between these two points; risk indexes are increasing at point A, and uncertainty is expected to be resolved subsequently, while uncertainty is being resolved currently at point B. If risk indexes show cyclical patterns like in Figure 1, then the two saving motives can be empirically differentiated from each other from observing both saving behavior and a time-series of risk indexes. In other words, we need to have both increasing and decreasing phases of risk indexes in order to identify the two saving motives.

Furthermore, given the implication that, as shown in the previous section, precautionary savings and savings as waiting options are exclusive under the preference with constant relative risk aversion, we expect that the response of savings to levels of risk indexes is opposite to the response of savings to changes in risk indexes. That is, if precautionary savings are dominant, then savings increase in levels of risk indexes, and decrease when risk indexes are currently increasing. Conversely, if savings as waiting options are dominant, then savings decrease in levels of risk indexes, and increase when risk indexes are currently increasing.

This section adopts the following empirical specification, thereby capturing the above broad implication for saving motives:

$$\frac{S_t}{Y_t} = \alpha Risk_{t-1} + \sum_{l=1}^{L} \beta_{k,l} \Delta_k Risk_{t-l} + \eta \frac{1}{Y_t} + \text{constant term}, \tag{1}$$

where S_t is a saving at time t, and Y_t is a disposable income at time t. $Risk_t$ denotes an index of riskiness at time t, while $\Delta_k Risk_t$ designates a change in riskiness from k-period lagged to current indexes. The below estimation explores the following cases: $(k = 1, L = 1)$, $(k = 1, L = 4)$, $(k = 2, L = 1)$, and $(k = 4, L = 1)$. A term $\frac{1}{Y_t}$ may capture either smooth consumption or savings as a buffer; therefore η is expected to be negative. In addition to these explanatory variables, we allow for seasonal dummies (quarterly dummies), a quadratic time trend, and time dummies associated with increases in the consumption tax rate.

Suppose that larger $Risk_t$ implies higher risk. According to the above implication, on the one hand, α is positive and β is negative when precautionary savings are dominant. On the other hand, α is negative and β is positive when savings as waiting options are dominant.

As suggested in the previous section, however, one remark on the interpretation of estimation results is that the theoretical exercise on which the empirical implications rely does not explore the interaction between the two saving motives at all. Hence, the above estimation patterns indicate that either of the two motives is dominant, however, they do not necessarily imply that the other motive is completely absent.

Specifying not a saving ratio, but consumption growth as a dependent variable, existing literature often regards a positive coefficient on levels of risk indexes as evidence for precautionary savings. Such an empirical implication is easily available from the preference with a constant degree of relative risk aversion γ.[3] However, one important advantage of the above saving ratio specification over the consumption growth specification is that the impact of levels of risk indexes on saving ratios depends on the interaction of saving motives and the magnitude of γ, and given this implication, two saving motives can be differentiated empirically from each other. For this reason, we explore the saving ratio specification defined as equation (1). The appendix discusses other estimation problems associated with the consumption growth specification in the context of risk measures we are using for estimation.

3.2. **Various measures of income uncertainty** There have been various kinds of measures of income uncertainty based on both micro and aggregate data among empirical studies of precautionary savings. Carroll and Samwick (1998) derive measures of income uncertainty from theoretical restrictions using panel data of U.S. households, the Panel Study of Income Dynamics, while Kazarosian (1997) derives measures of income uncertainty from U.S. panel data, the National Longitudinal Survey. Hahm and Steigerwald (1999) construct measures of income uncertainty from a panel of forecasts.

Banks, Blundell and Brugiavini (2001) estimate conditional variances of the income process using a long time-series of British household data. Kantor and Fishback (1996) identify the introduction of workers' compensation as a device to reduce income uncertainty using individual households surveyed for the 1917-1919 Bureau of Labor Statistics cost-of-living study. Dunn (1998) derives unemployment risks from household level data. As proxies for income uncertainty, Murata (2003) uses consumers' opinions about future public pensions available from Japanese household panel data.

[3] See footnote 2.

Carroll, Dynan and Krane (1999) use as measures of income uncertainty, unemployment probabilities calculated from the Current Population Survey. Malley and Moutos (1996) propose that an aggregate unemployment rate is a valuable measure of aggregate income uncertainty. Ejarque (1997) estimates conditional variances for macroeconomic data as proxies for income uncertainty, and use them to explore effects of uncertainty on durable consumption.

Many studies use consumer sentiment or confidence as alternative proxies for income uncertainty. Examples include Acemoglu and Scott (1994), Carroll, Fuhrer, and Wilcox (1994), and Throop (1992). Based on a method proposed by Carlson and Parkin (1975), Ogawa (1991), Nakagawa (1998), and Doi (2001) calculate variances of real income growth from consumer confidence surveyed for Japanese households.

Given the difficulty with obtaining long-run series of cross-sectional or panel data of individual households in Japan, we use two different sets of proxies for income uncertainty, aggregate unemployment statistics and consumer confidence surveys. The former data include aggregate unemployment rates released by the Ministry of Public Management, and both active and new job opening rates compiled by the Ministry of Health and Labor. On the other hand, the latter data are available from the consumer confidence surveys for households compiled by the Economic and Social Research Institute, Cabinet Office.

The above confidence surveys report the following indexes in quarterly frequency with seasonal adjustments: (0) overall attitudes, (1) livelihoods, (2) increases in income, (3) decreases in consumer price indexes, (4) employment environments, and (5) willingness to purchase durable goods. The last index is available from 1982, while the other indexes are available from 1972. Notice that the degree of riskiness is definitely decreasing in the magnitude of indexes among the above measures except for both aggregate unemployment rates and concerns about price levels.

As Figures 2 and 3 demonstrate, all risk indexes except for aggregate unemployment rates show clear cyclical patterns. Exploiting such time-series patterns of these measures of income uncertainty, therefore, we may differentiate precautionary saving motives from saving motives as waiting options in a systematic manner.

3.3. **Estimation results** A new system of national accounts was adopted by the United Nations in 1993. This system is called the 93SNA. Most governments including the Japanese Government have recently switched from the system approved in 1968 (hereafter, the 68SNA) to the 93SNA. As a result of this shift in the manner of accounting, the definitions of many macroeconomic variables including disposable income have been changed substantially.

What matters in the context of our estimation procedure is that there are non-negligible discrepancies in time-series of aggregate saving ratios between the 68SNA and the 93SNA (see Figure 4). According to the Economic and Social Research Institute, Cabinet Office, such discrepancies are caused mainly by the exclusion of the depreciation of non-performing loans (hereafter, NPLs) from disposable income in the 93SNA. As shown in Figure 4, if the amount of NPL depreciation appropriated in the household sector is included in the 93SNA disposable income, then the above discrepancy narrows to some extent. Once the amount of NPL depreciation capitalized in private financial corporations is incorporated into the 93SNA disposable income, the discrepancy almost disappears.

In consideration of the above shift in the manner of accounting, we have provided for two sets of time-series of aggregate saving ratios, defined as the ratio of household savings to disposable income. The first set is the quarterly series based on the 68SNA for the period between the third quarter of 1983 and the first quarter of 1999. All six indexes of consumer sentiment are available for this period. The second set is the quarterly series based on the 93SNA for the period between the second quarter of 1991 and the first quarter of 2001; the

93SNA referential series are available only up to the year 1991.

In estimating equation (1), we use seasonally non-adjusted series for saving ratios and an inverse of disposable income, and seasonally adjusted series for risk indexes and a difference in risk indexes. As mentioned before, differences in risks indexes are defined as changes to current indexes from one-quarter lagged, two-quarter lagged, and four-quarter lagged indexes. Disposable income is instrumented in an autoregressive manner up to two quarter lags.

In addition, a set of explanatory variables includes (i) the second, third, and fourth quarter dummies to control for seasonality, (ii) dummy variables associated with increases in the consumption tax rate in April 1989 and April 1997 to control for effects of the introduction of consumption tax increases on last-minute buying,[4] and (iii) quadratic terms of time to allow for the non-linear time trend.

The first panel of Table 1 reports estimation results for the first data set with changes from one quarter lag as differences in risks. As shown by overidentification tests, a choice of instrument variables is legitimate for these estimation procedures.

Overall results indicate that the saving behavior since the 1980s is more consistent with a dominant precautionary saving motive. In terms of labor market indicators, a decrease in job opening rates, both active and new, leads to an increase in saving ratios in a statistically significant manner. Though less significant, higher saving ratios are also accompanied by higher unemployment rates. Such a difference in statistical significance between job opening and unemployment may be attributed to the fact that the latter indicators exhibit less cyclical patterns. Coefficients on $\Delta Risk_t$ are not significant at all in these cases, thereby implying the weakness of saving motives as waiting options. As shown

[4] More concretely, a dummy variable for the first quarter of 1989 (1997) is minus one, and a dummy variable for the second quarter of 1989 (1997) is one.

in the second through the fourth panels, the above estimation results available from labor market indicators do not depend on either the number of lags (L) or the interval length in defining $\Delta Risk_t$ (k).

Regarding estimation results from consumer sentiment, the signs of estimated coefficients on levels and changes in sentiment are also consistent with a dominant precautionary saving motive; that is, except for variables of inflationary concerns, the sign associated with levels are negative, while that with changes are positive. In particular, negative sentiment about labor income and the employment environment significantly leads to an increase in saving ratios. In particular, such patterns in estimation are more conspicuous for the second panel ($k = 1$, $L = 4$) and the third and fourth panels ($k = 2$ or 4, $L = 1$). What is interesting is that inflationary concerns significantly lower saving ratios for this sample period. The above estimation results agree with those of Nakagawa (1998) and Doi (2001) in that a precautionary motive is dominant in determining aggregate saving ratios in Japan.

Table 2 reports estimation results for the second data set without adjusting any amount of NPLs. According to tests of overidentifying restrictions, the choice of instrumental variables is appropriate. The estimation results offer some evidence for savings as waiting options during the 1990s. With respect to both active and new job opening rates, not levels, but changes in risks do matter in determining saving ratios in favor of savings as waiting options. More concretely, saving ratios tend to go up with deteriorating conditions in labor markets, and go down with improving conditions.

The estimation results from consumer sentiment, on the other hand, are similar to those of the first data set, and more consistent with a dominant precautionary saving motive. Negative sentiment about overall attitudes, livelihood, labor environments, and willingness to purchase durable goods significantly leads to an increase in saving ratios. One difference from the results of the first set is that inflationary concerns do not necessarily lead to a decrease in saving ratios.

Table 3 reports estimation results for the case where the NPL depreciation appropriated in the household sector is added to the 93SNA disposable income. Most results are almost the same as those of Table 2 in terms of both overidentification tests and estimated coefficients.

In sum, the overall saving behavior since the 1980s is more consistent with a dominant precautionary saving motive; according to the estimation results from both labor market statistics and consumer sentiment, levels of riskiness, not changes in risk indexes, do matter in determining aggregate saving ratios in favor of precautionary motives. From more recent behavior, however, some evidence is found for savings as waiting options; saving ratios depend on whether labor market conditions are deteriorating or improving.

As discussed earlier, the empirical specification adopted in this study can demonstrate that either of the two motives is dominant, but it does not necessarily nullify completely the other motive. Thus, the above difference and similarity in estimation results between Table 1 and Table 2 (3) may not indicate that the saving behavior had changed considerably from precautionary savings to savings as waiting options between the 1980s and the 1990s, but imply that a saving motive as waiting options had been stronger in the 1990s than in the 1980s.

4. Conclusion

As mentioned in the introduction, savings as waiting options are often confused with precautionary savings in practice, while both saving motives are not necessarily differentiated rigorously from each other in theoretical models. Accordingly, although precautionary saving motives have been empirically examined in depth, savings as waiting options tend to be ignored largely or treated only implicitly in existing literature. This paper attempts to challenge such an asymmetric treatment between the two saving motives in empirical studies of consumption and savings.

Exploiting broad implications available from a model of savings under uncertainty proposed by Epstein (1980), this paper empirically examines which motive is more dominant in aggregate household saving in Japan, precautionary savings or savings as waiting options. In particular, it bases the empirical specification on the following broad implication: the former motive is driven by the magnitude of risks, while the latter is promoted by the subsequent resolution of uncertainty. Empirical results indicate that the saving behavior since the 1980s is more consistent with dominant precautionary savings; however, estimation results from the behavior during the 1990s offer some evidence in favor of savings as waiting options.

Appendix: On estimation of consumption growth specifications

Figure A-1 depicts the 68SNA series of one-year aggregate consumption growth, both total and non-durable plus service, for the period between 1981 and 1999. Using these quarterly series, we estimate a typical consumption growth function. That is, one-year consumption growth is regressed on a level of a risk measure and corresponding income growth with instrumental variables. A positive coefficient on a risk measure is interpreted as evidence for precautionary savings (when risk indexes are increasing in riskiness), while a positive coefficient on income growth is interpreted as evidence for liquidity constraints. A major reason for using one-year growth as a dependent variable is that frictional factors are expected to be weaker in determining consumption profiles over one year.

Table A-1 reports estimation results for both total and non-durable plus service consumption. The estimation results demonstrate that without any risk index, consumption growth is statistically responsive to expected income growth, thereby implying the presence of liquidity constraints. Once a risk index is included as an explanatory variable, however, coefficients on expected income growth are no longer significant in most cases, while coefficients on risk indexes are sometimes significant, but their signs are opposite to the above theoretical implication.

These estimation patterns suggest that there is a strong multicolinearity between expected income growth and the risk index used in this paper. In the presence of such a multicolinearity, it is rather difficult to differentiate precautionary saving motives from liquidity constraints using the consumption growth specification with the risk indexes used in this paper.

REFERENCES

[1] Acemoglu, Daron and Andrew Scott, 1994, "Consumer confidence and rational expectations: Are agents' beliefs consistent with the theory?" Economic Journal 104(422), 1-19.

[2] Banks, James, Richard Blundell, and Agar Brugiavini, 2001, "Risk pooling, precautionary saving and consumption growth," Review of Economic Studies 68(4), 757-79.

[3] Blanchard, Olivier Jean, 1993, "Consumption and the Recession of 1990-1991," American Economic Review 83(2), 270-74.

[4] Carlson, John A. and Michael Parkin, 1975, "Inflation expectation," Economica 42, 123-138.

[5] Carroll, Christopher D., Karen E. Dynan, and Spencer D. Krane, 1999, "Unemployment risk and precautionary wealth: Evidence from households' balance sheets," Finance and Economics Discussion Paper Series 99/15, Board of Governors of the Federal Reserve System.

[6] Carroll, Christopher D., Jeffrey C. Fuhrer, and David W. Wilcox, 1994, "Does con-

sumer sentiment forecast household spending? If so, why?" American Economic Review 84(5), 1397-1408.

[7] Carroll, Christopher D. and Andrew A. Samwick, 1998, "How important is precautionary saving?" Review of Economics and Statistics 80(3), 410-19.

[8] Doi, Takero, 2001, "Tests of precautionary saving motives based on saving functions," (in Japanese) Discussion Paper Series 1, Economic and Social Research Institute, Cabinet Office.

[9] Dunn, Wendy, E., 1998, "Unemployment risk, precautionary saving, and durable goods purchase decisions," Finance and Economics Discussion Paper Series: 98/49, Board of Governors of the Federal Reserve System.

[10] Ejarque, Joao Miguel, 1997, "Uncertainty and durable consumption in the Great Depression," Institute of Economics Discussion Paper 97/04, University of Copenhagen.

[11] Epstein, Larry, G., 1980, "Decision making and the temporal resolution of uncertainty," International Economic Review 21 (2), 269-283.

[12] Hahm, Joon, H. and Douglas G. Steigerwald, 1999, "Consumption adjustment under time-varying income uncertainty," Review of Economics and Statistics 81(1), 32-40.

[13] Kantor, Shawn Everett and Price V. Fishback, 1996, "Precautionary saving, insurance, and the origins of workers' compensation," Journal of Political Economy 104(2), 419-42.

[14] Kazarosian, Mark, 1997, "Precautionary savings: A panel study," Review of Economics and Statistics 79(2), 241-47.

[15] Malley, James R. and Thomas Moutos, 1996, "Unemployment and consumption," Oxford Economic Papers 48(4), 584-600.

[16] Murata, Keiko, 2003, "Precautionary savings and income uncertainty: Evidence from Japanese micro data," mimeo, Institute of Monetary and Economic Studies, Bank of Japan.

[17] Nakagawa, Shinobu, 1998, "Consumption behavior under uncertainty," (in Japanese) Working Paper 98-6, Department of Research and Statistics, Bank of Japan.

[18] Ogawa, Kazuo, 1991, "Income risks and precautionary savings," (in Japanese) Keizai Kenkyu 42, 139-152.

[19] Rothschild, Michael and Joseph Stiglitz, 1971, "Increasing risk II: Its economic consequences," Journal of Economic Theory 3, 66-84.

[20] Throop, Adrian W., 1992, "Consumer sentiment: Its causes and effects," Federal Reserve Bank of San Francisco Economic Review 1, 35-59.

Table 1. Estimation Results of Saving Functions

68SNA saving ratio, seasonally non-adjusted

Sample period: 1983:III–1999:I

	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
	[A] lagged differences of risk indicators									
(Second Stage Regressions)										
$Risk_{-1}$	–––	0.016	–0.030***	–0.023***	–0.055	–0.102	–0.234	0.143***	–0.069**	0.111
	(–––)	(0.011)	(0.011)	(0.009)	(0.103)	(0.138)	(0.148)	(0.055)	(0.032)	(0.098)
$\Delta Risk_{-1}$	–––	0.010	–0.034	–0.015	0.020	0.116	0.066	–0.030	0.084*	–0.021
	(–––)	(0.028)	(0.041)	(0.030)	(0.123)	(0.155)	(0.205)	(0.067)	(0.048)	(0.101)
$1/Y$	–0.352**	–0.228	–0.252*	–0.252*	–0.343**	–0.336**	–0.280*	–0.255*	–0.286*	–0.357*
	(0.174)	(0.140)	(0.149)	(0.147)	(0.169)	(0.162)	(0.153)	(0.150)	(0.155)	(0.182)
OI test	1.072	1.230	0.905	0.976	0.116	0.181	0.285	0.887	0.395	0.212
	[0.300]	[0.267]	[0.342]	[0.323]	[0.733]	[0.670]	[0.593]	[0.346]	[0.530]	[0.645]
(First Stage Regressions)										
$1/Y$	0.967	0.966	0.967	0.967	0.966	0.966	0.966	0.967	0.966	0.967
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	[B] one- to four-quarter lagged differences of risk indicators									
(Second Stage Regressions)										
$Risk_{-1}$	–––	0.015	–0.035**	–0.025**	–0.167	–0.191	–0.362**	0.153**	–0.058	0.028
	(–––)	(0.011)	(0.015)	(0.011)	(0.116)	(0.183)	(0.173)	(0.071)	(0.041)	(0.128)
$\Delta Risk_{-1}$	–––	0.004	0.010	–0.003	0.025	0.097	–0.007	–0.043	0.085*	0.023
	(–––)	(0.030)	(0.111)	(0.055)	(0.145)	(0.182)	(0.241)	(0.069)	(0.049)	(0.107)
$\Delta Risk_{-2}$	–––	0.034	–0.119	–0.033	0.324***	0.258*	0.542**	0.032	–0.021	0.176**
	(–––)	(0.027)	(0.132)	(0.058)	(0.113)	(0.152)	(0.254)	(0.071)	(0.058)	(0.089)
$\Delta Risk_{-3}$	–––	–0.015	0.031	0.002	–0.128	–0.095	–0.192	–0.062	0.027	–0.067
	(–––)	(0.033)	(0.166)	(0.061)	(0.150)	(0.192)	(0.293)	(0.082)	(0.069)	(0.100)
$\Delta Risk_{-4}$	–––	0.029	0.065	0.024	0.134	0.149	0.255	–0.034	–0.054	0.129
	(–––)	(0.029)	(0.125)	(0.062)	(0.132)	(0.146)	(0.220)	(0.081)	(0.051)	(0.079)
$1/Y$	–0.352**	–0.248*	–0.249*	–0.260*	–0.327**	–0.284*	–0.265*	–0.242	–0.276*	–0.327*
	(0.174)	(0.127)	(0.148)	(0.137)	(0.165)	(0.157)	(0.156)	(0.159)	(0.146)	(0.171)
OI test	1.072	0.590	1.441	1.087	0.026	0.046	0.450	0.864	0.261	0.013
	[0.300]	[0.442]	[0.230]	[0.297]	[0.872]	[0.829]	[0.502]	[0.352]	[0.610]	[0.910]
(First Stage Regressions)										
$1/Y$	0.967	0.965	0.966	0.966	0.967	0.964	0.966	0.965	0.964	0.966
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Table 1 (continued)

	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
[C] lagged differences of risk indicators from two quarters earlier										
(Second Stage Regressions)										
$Risk_{-1}$	–––	0.015	–0.030***	–0.023***	–0.156	–0.166	–0.314**	0.132**	–0.069**	0.030
	(–––)	(0.011)	(0.011)	(0.009)	(0.104)	(0.150)	(0.152)	(0.064)	(0.031)	(0.109)
$\Delta_2 Risk_{-1}$	–––	0.021	–0.019	–0.010	0.169**	0.161	0.229	0.011	0.035	0.100
	(–––)	(0.019)	(0.021)	(0.016)	(0.084)	(0.105)	(0.148)	(0.056)	(0.040)	(0.078)
1/Y	–0.352**	–0.229*	–0.255*	–0.254*	–0.324*	–0.304*	–0.257*	–0.255*	–0.298*	–0.350**
	(0.174)	(0.138)	(0.148)	(0.145)	(0.171)	(0.159)	(0.151)	(0.147)	(0.162)	(0.171)
OI test	1.072	0.981	0.895	0.958	0.139	0.169	0.637	0.751	0.305	0.104
	[0.300]	[0.322]	[0.344]	[0.328]	[0.709]	[0.681]	[0.425]	[0.386]	[0.581]	[0.748]
(First Stage Regressions)										
1/Y	0.967	0.966	0.967	0.967	0.966	0.966	0.966	0.967	0.966	0.967
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
[D] lagged differences of risk indicators from four quarters earlier										
(Second Stage Regressions)										
$Risk_{-1}$	–––	0.014	–0.029**	–0.022**	–0.102	–0.153	–0.317	0.157**	–0.068*	0.045
	(–––)	(0.011)	(0.012)	(0.009)	(0.144)	(0.197)	(0.195)	(0.069)	(0.039)	(0.129)
$\Delta_4 Risk_{-1}$	–––	0.013	–0.008	–0.004	0.060	0.082	0.131	–0.028	0.013	0.061
	(–––)	(0.011)	(0.011)	(0.009)	(0.097)	(0.115)	(0.119)	(0.042)	(0.031)	(0.077)
1/Y	–0.352**	–0.235*	–0.253*	–0.250*	–0.338**	–0.323**	–0.272*	–0.247*	–0.303*	–0.346**
	(0.174)	(0.137)	(0.149)	(0.146)	(0.169)	(0.158)	(0.143)	(0.150)	(0.158)	(0.166)
OI test	1.072	1.037	0.892	0.962	0.136	0.193	0.351	0.901	0.274	0.317
	[0.300]	[0.308]	[0.345]	[0.327]	[0.712]	[0.660]	[0.553]	[0.343]	[0.601]	[0.573]
(First Stage Regressions)										
1/Y	0.967	0.967	0.967	0.967	0.966	0.966	0.966	0.966	0.966	0.967
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Notes: 1. Estimation results are based on 2LS with the following instrumental variables: $Risk_{-1}$, $\Delta Risk_{-1}$, $1/Y_{-1}$, $1/Y_{-2}$, constant terms, and dummies.

2. Figures in parentheses are heteroskedasticity-robust standard errors, while symbols ***, ** and * indicate that estimated coefficients are statistically significant at 1, 5, and 10 percent levels respectively.

3. The row labeled “OI test” reports test statistics of overidentifying restrictions, and their *p*-values in brackets.

4. The row labeled “first stage regressions” reports adjusted R^2 of OLS regressions of *1/Y* using instrumental variables, and *p*-values for the null hypothesis of zero coefficients in brackets.

Table 2. Estimation Results of Saving Functions

93SNA adjusted saving ratio, seasonally non-adjusted

Sample period: 1991:II–2001:I

	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
[A] lagged differences of risk indicators										
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.005	–0.007	–0.010	–0.171**	–0.223***	–0.214**	–0.020	–0.057**	–0.098*
	(–––)	(0.013)	(0.015)	(0.011)	(0.068)	(0.084)	(0.098)	(0.045)	(0.024)	(0.056)
$\Delta Risk_{-1}$	–––	0.008	–0.090**	–0.064***	0.155*	0.167*	0.226	0.045	0.046	0.121**
	(–––)	(0.018)	(0.036)	(0.022)	(0.081)	(0.101)	(0.166)	(0.048)	(0.036)	(0.060)
$1/Y$	–0.857***	–0.858***	–0.904***	–0.908***	–0.890***	–0.892***	–0.903***	–0.846***	–0.909***	–0.891***
	(0.138)	(0.137)	(0.169)	(0.169)	(0.159)	(0.156)	(0.164)	(0.135)	(0.173)	(0.155)
OI test	0.182	0.210	0.337	0.600	0.143	0.122	0.433	0.060	0.484	0.027
	[0.670]	[0.647]	[0.561]	[0.439]	[0.705]	[0.727]	[0.511]	[0.807]	[0.487]	[0.869]
(First Stage Regressions)										
$1/Y$	0.988	0.988	0.990	0.990	0.989	0.989	0.989	0.988	0.990	0.988
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
[B] one- to four-quarter lagged differences of risk indicators										
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.032**	0.018	–0.006	–0.224**	–0.302**	–0.148	–0.123**	–0.046	–0.187***
	(–––)	(0.015)	(0.024)	(0.020)	(0.093)	(0.121)	(0.134)	(0.058)	(0.035)	(0.070)
$\Delta Risk_{-1}$	–––	–0.011	0.030	–0.012	0.223**	0.231**	0.240	0.121**	0.042	0.206***
	(–––)	(0.017)	(0.087)	(0.045)	(0.090)	(0.107)	(0.158)	(0.054)	(0.035)	(0.062)
$\Delta Risk_{-2}$	–––	0.042***	–0.205	–0.066	0.003	0.021	–0.358**	0.102**	–0.060*	0.118*
	(–––)	(0.012)	(0.138)	(0.059)	(0.099)	(0.127)	(0.155)	(0.048)	(0.031)	(0.061)
$\Delta Risk_{-3}$	–––	0.090***	0.153	–0.029	0.147	0.148	0.225	0.094	0.009	0.111*
	(–––)	(0.023)	(0.124)	(0.058)	(0.102)	(0.133)	(0.176)	(0.062)	(0.042)	(0.058)
$\Delta Risk_{-4}$	–––	–0.030	–0.125	0.033	0.067	0.154	–0.127	0.115**	0.003	0.100**
	(–––)	(0.020)	(0.093)	(0.059)	(0.075)	(0.110)	(0.156)	(0.050)	(0.046)	(0.046)
$1/Y$	–0.857***	–0.894***	–0.884***	–0.906***	–0.910***	–0.942***	–0.859***	–0.862***	–0.902***	–0.873***
	(0.138)	(0.129)	(0.154)	(0.172)	(0.167)	(0.172)	(0.125)	(0.151)	(0.159)	(0.157)
OI test	0.182	0.079	1.165	0.530	0.433	0.359	1.578	0.384	0.603	0.281
	[0.670]	[0.778]	[0.280]	[0.467]	[0.511]	[0.549]	[0.209]	[0.536]	[0.437]	[0.596]
(First Stage Regressions)										
$1/Y$	0.988	0.990	0.990	0.990	0.988	0.987	0.988	0.988	0.989	0.987
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Table 2 (continued)

	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
	[C] lagged differences of risk indicators from two quarters earlier									
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.012	–0.001	–0.005	–0.155*	–0.207**	–0.153	–0.034	–0.045*	–0.108*
	(–––)	(0.013)	(0.015)	(0.011)	(0.079)	(0.095)	(0.113)	(0.043)	(0.027)	(0.058)
$\Delta_2 Risk_{-1}$	–––	0.019	–0.056***	–0.041***	0.045	0.041	–0.062	0.053	–0.009	0.082*
	(–––)	(0.013)	(0.021)	(0.014)	(0.065)	(0.079)	(0.103)	(0.036)	(0.024)	(0.043)
1/Y	–0.857***	–0.874***	–0.897***	–0.917***	–0.876***	–0.875***	–0.887***	–0.809***	–0.879***	–0.832***
	(0.138)	(0.144)	(0.165)	(0.171)	(0.148)	(0.148)	(0.156)	(0.130)	(0.155)	(0.128)
OI test	0.182	0.211	0.513	0.560	0.244	0.277	0.425	0.069	0.497	0.088
	[0.670]	[0.646]	[0.474]	[0.454]	[0.622]	[0.598]	[0.514]	[0.793]	[0.481]	[0.767]
(First Stage Regressions)										
1/Y	0.988	0.989	0.990	0.989	0.988	0.988	0.989	0.988	0.989	0.988
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	[D] lagged differences of risk indicators from four quarters earlier									
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.030*	0.012	0.003	–0.228**	–0.313***	–0.181	–0.120**	–0.050	–0.164**
	(–––)	(0.016)	(0.018)	(0.013)	(0.097)	(0.117)	(0.149)	(0.057)	(0.038)	(0.065)
$\Delta_4 Risk_{-1}$	–––	0.023**	–0.034**	–0.023**	0.109	0.141	0.004	0.106***	0.001	0.121**
	(–––)	(0.009)	(0.014)	(0.010)	(0.072)	(0.088)	(0.106)	(0.038)	(0.026)	(0.048)
1/Y	–0.857***	–0.863***	–0.913***	–0.913***	–0.900***	–0.900***	–0.891***	–0.850***	–0.885***	–0.859***
	(0.138)	(0.141)	(0.167)	(0.170)	(0.159)	(0.157)	(0.162)	(0.126)	(0.163)	(0.135)
OI test	0.182	0.220	0.754	0.727	0.453	0.525	0.379	0.467	0.488	0.720
	[0.670]	[0.639]	[0.385]	[0.394]	[0.501]	[0.469]	[0.538]	[0.494]	[0.485]	[0.396]
(First Stage Regressions)										
1/Y	0.988	0.990	0.990	0.990	0.989	0.988	0.989	0.988	0.989	0.988
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Notes: 1. Estimation results are based on 2LS with the following instrumental variables: $Risk_{-1}$, $\Delta_k Risk_{-l}$, $1/Y_{-1}$, $1/Y_{-2}$, constant terms, and dummies.

2. Figures in parentheses are heteroskedasticity-robust standard errors, while symbols ***, ** and * indicate that estimated coefficients are statistically significant at 1, 5, and 10 percent levels respectively.

3. The row labeled "OI test" reports test statistics of overidentifying restrictions, and their *p*-values in brackets.

4. The row labeled "first stage regressions" reports adjusted R^2 of OLS regressions of *1/Y* using instrumental variables, and *p*-values for the null hypothesis of zero coefficients in brackets.

Table 3. Estimation Results of Saving Functions

93SNA adjusted saving ratio + NPL disposition, seasonally non-adjusted

Sample period: 1991:II–2001:I

	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
[A] lagged differences of risk indicators										
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.011	0.019	0.005	–0.253**	–0.339**	–0.247*	–0.059	–0.074**	–0.177*
	(–––)	(0.018)	(0.021)	(0.015)	(0.111)	(0.142)	(0.143)	(0.063)	(0.037)	(0.095)
$\Delta Risk_{-1}$	–––	0.049	–0.192***	–0.146***	0.061	0.079	–0.112	0.101	–0.045	0.120
	(–––)	(0.030)	(0.062)	(0.040)	(0.131)	(0.170)	(0.262)	(0.072)	(0.057)	(0.085)
1/Y	–0.926***	–0.922***	–0.987***	–0.991***	–0.981***	–0.979***	–0.967***	–0.908***	–0.948***	–0.978***
	(0.215)	(0.194)	(0.211)	(0.209)	(0.216)	(0.210)	(0.225)	(0.201)	(0.215)	(0.214)
OI test	1.109	1.606	1.586	2.434	1.400	1.451	1.583	0.603	2.050	0.941
	[0.292]	[0.205]	[0.208]	[0.119]	[0.237]	[0.228]	[0.208]	[0.437]	[0.152]	[0.332]
(First Stage Regressions)										
1/Y	0.977	0.979	0.982	0.982	0.979	0.979	0.981	0.975	0.981	0.977
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
[B] one- to four-quarter lagged differences of risk indicators										
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.029	0.008	–0.015	–0.347***	–0.477***	–0.138	–0.333***	–0.047	–0.350***
	(–––)	(0.023)	(0.036)	(0.027)	(0.125)	(0.152)	(0.175)	(0.069)	(0.041)	(0.086)
$\Delta Risk_{-1}$	–––	0.023	–0.154	–0.102	0.182	0.207	–0.120	0.290***	–0.059	0.299***
	(–––)	(0.029)	(0.110)	(0.063)	(0.151)	(0.184)	(0.295)	(0.066)	(0.058)	(0.082)
$\Delta Risk_{-2}$	–––	0.079***	–0.198	–0.135*	0.032	0.084	–0.435*	0.272***	–0.107**	0.217***
	(–––)	(0.018)	(0.181)	(0.075)	(0.149)	(0.175)	(0.241)	(0.057)	(0.049)	(0.079)
$\Delta Risk_{-3}$	–––	0.082**	0.225	0.018	0.264*	0.292	0.206	0.346***	–0.033	0.279***
	(–––)	(0.037)	(0.195)	(0.087)	(0.157)	(0.187)	(0.289)	(0.072)	(0.049)	(0.074)
$\Delta Risk_{-4}$	–––	–0.074**	–0.050	0.112	0.076	0.174	–0.198	0.189**	0.019	0.145**
	(–––)	(0.034)	(0.146)	(0.080)	(0.139)	(0.191)	(0.293)	(0.078)	(0.078)	(0.061)
1/Y	–0.926***	–1.017***	–0.935***	–1.000***	–0.989***	–1.016***	–0.894***	–0.867***	–0.938***	–0.920***
	(0.215)	(0.183)	(0.208)	(0.216)	(0.216)	(0.226)	(0.179)	(0.151)	(0.191)	(0.189)
OI test	1.109	1.344	1.824	1.669	2.572	2.520	3.278	4.333	2.110	2.905
	[0.292]	[0.246]	[0.177]	[0.196]	[0.109]	[0.112]	[0.070]	[0.037]	[0.146]	[0.088]
(First Stage Regressions)										
1/Y	0.977	0.983	0.981	0.980	0.978	0.978	0.979	0.986	0.981	0.981
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Table 3 (continued)

	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
	[C] lagged differences of risk indicators from two quarters earlier									
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.026	0.029	0.014	–0.236**	–0.328**	–0.155	–0.098	–0.050	–0.196**
	(–––)	(0.019)	(0.022)	(0.015)	(0.118)	(0.146)	(0.144)	(0.070)	(0.037)	(0.098)
$\Delta_2 Risk_{-1}$	–––	0.054***	–0.103***	–0.086***	–0.001	0.014	–0.266*	0.135*	–0.080**	0.096
	(–––)	(0.018)	(0.036)	(0.023)	(0.096)	(0.117)	(0.161)	(0.076)	(0.037)	(0.068)
1/Y	–0.926***	–0.972***	–0.965***	–1.004***	–0.977***	–0.970***	–0.963***	–0.807***	–0.933***	–0.914***
	(0.215)	(0.199)	(0.206)	(0.218)	(0.211)	(0.209)	(0.209)	(0.172)	(0.193)	(0.187)
OI test	1.109	1.424	2.042	2.217	1.512	1.597	1.986	0.646	2.296	1.125
	[0.292]	[0.233]	[0.153]	[0.137]	[0.219]	[0.206]	[0.159]	[0.421]	[0.130]	[0.289]
(First Stage Regressions)										
1/Y	0.977	0.983	0.981	0.982	0.979	0.979	0.980	0.975	0.981	0.977
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	[D] lagged differences of risk indicators from four quarters earlier									
(Second Stage Regressions)										
$Risk_{-1}$	–––	–0.048**	0.046	0.026	–0.372***	–0.500***	–0.158	–0.323***	–0.042	–0.328***
	(–––)	(0.024)	(0.028)	(0.020)	(0.125)	(0.151)	(0.189)	(0.087)	(0.044)	(0.088)
$\Delta_4 Risk_{-1}$	–––	0.041***	–0.052**	–0.041**	0.150	0.198	–0.122	0.274***	–0.045	0.219***
	(–––)	(0.015)	(0.024)	(0.017)	(0.107)	(0.137)	(0.200)	(0.065)	(0.043)	(0.062)
1/Y	–0.926***	–0.934***	–0.983***	–0.989***	–0.994***	–0.991***	–0.972***	–0.906***	–0.940***	–0.929***
	(0.215)	(0.199)	(0.208)	(0.216)	(0.223)	(0.218)	(0.218)	(0.134)	(0.201)	(0.183)
OI test	1.109	1.372	2.320	2.374	1.899	2.102	1.608	3.369	2.080	3.209
	[0.292]	[0.241]	[0.128]	[0.123]	[0.168]	[0.147]	[0.205]	[0.066]	[0.149]	[0.073]
(First Stage Regressions)										
1/Y	0.977	0.982	0.981	0.981	0.980	0.979	0.980	0.981	0.981	0.981
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Notes: 1. Estimation results are based on 2LS with the following instrumental variables: $Risk_{-1}$, $\Delta_k Risk_{-l}$, $1/Y_{-1}$, $1/Y_{-2}$, constant terms, and dummies.

2. Figures in parentheses are heteroskedasticity-robust standard errors, while symbols ***, ** and * indicate that estimated coefficients are statistically significant at 1, 5, and 10 percent levels respectively.

3. The row labeled "OI test" reports test statistics of overidentifying restrictions, and their *p*-values in brackets.

4. The row labeled "first stage regressions" reports adjusted R^2 of OLS regressions of *1/Y* using instrumental variables, and *p*-values for the null hypothesis of zero coefficients in brackets.

Figure 1. Risks and Resolution of Uncertainty

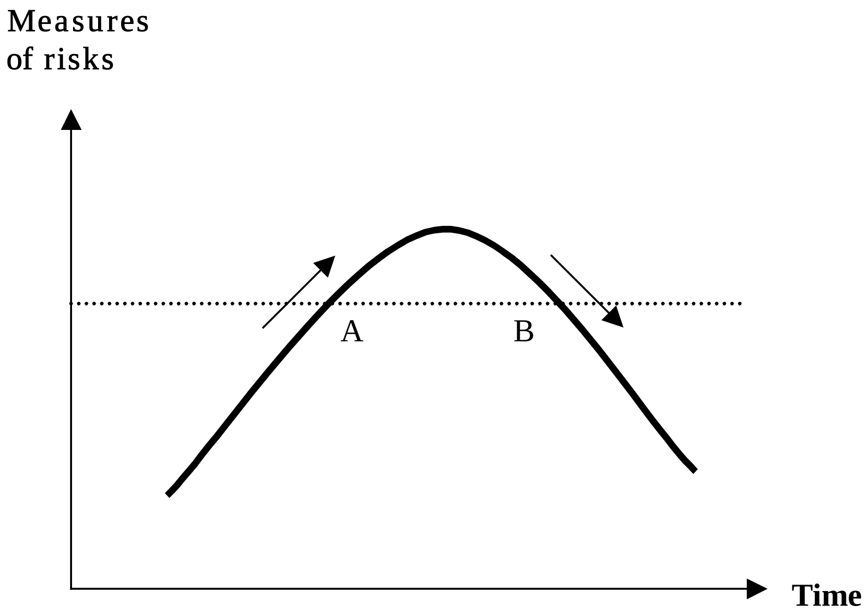
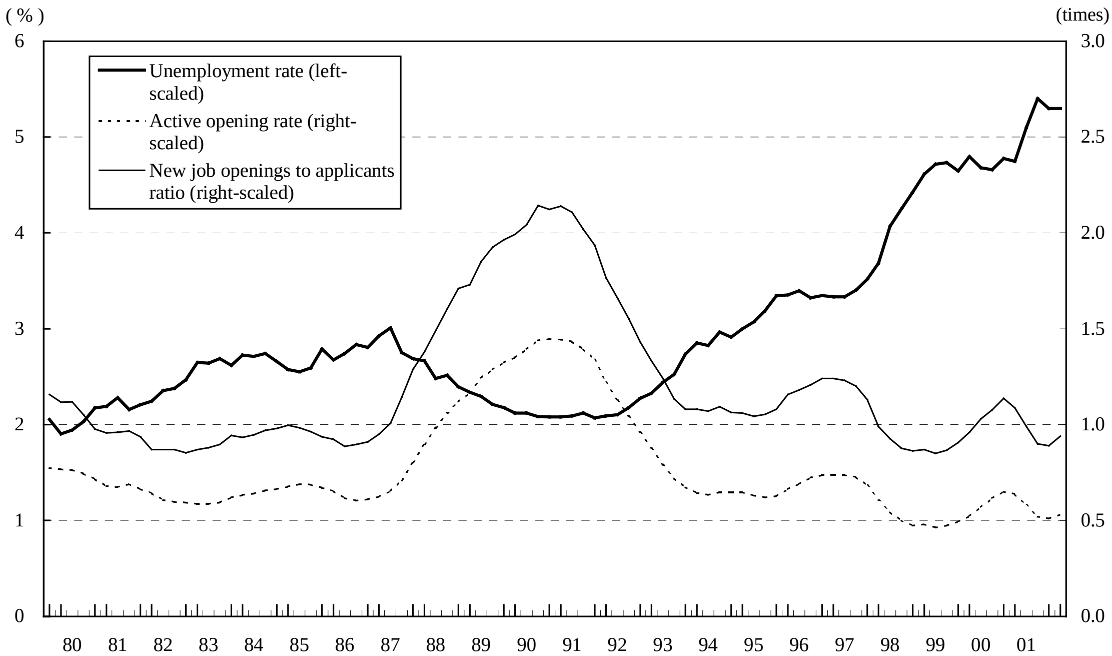


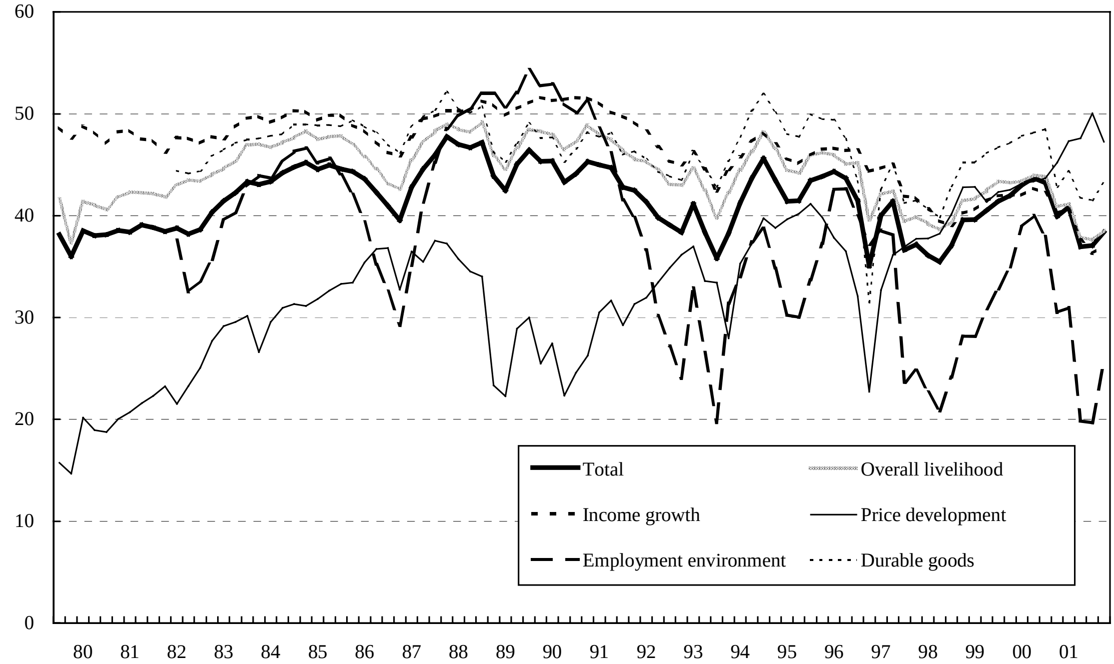
Figure 2. Labor Market Statistics: Unemployment and Job Opening



Note: Figures are seasonally adjusted.

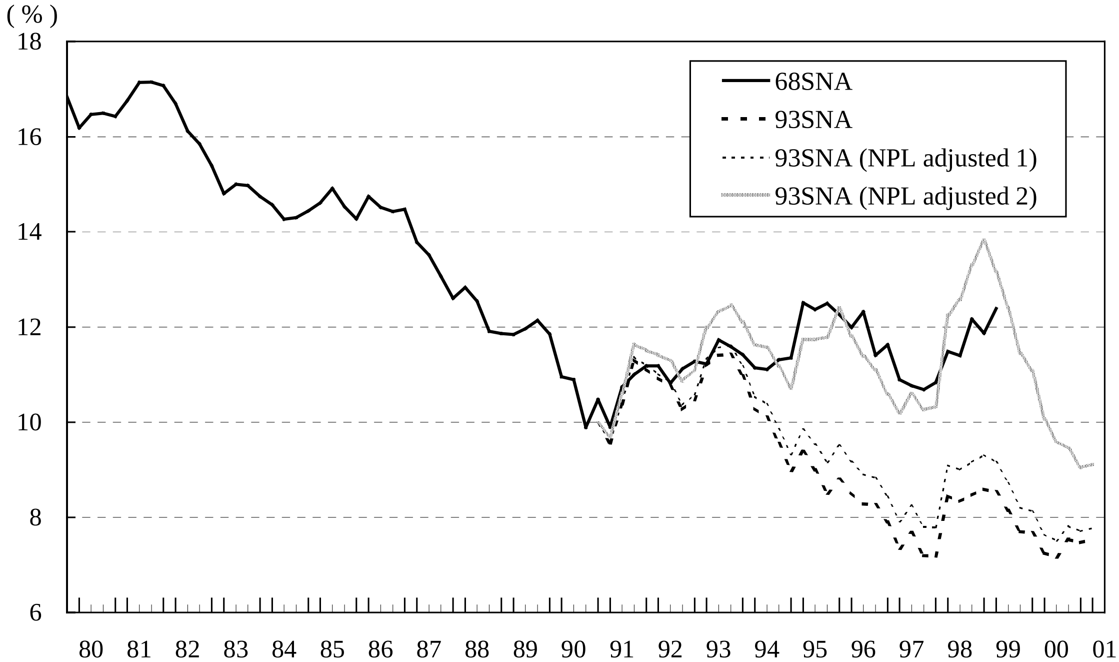
Sources: Ministry of Public Management, Home Affairs, Posts and Telecommunications, *Labor Force Survey*; Ministry of Health, Labor and Welfare, *Report on Employment Service*.

Figure 3. Consumer Sentiment Indicators



Note: Figures are seasonally adjusted.
Sources: Cabinet Office, *Consumer Confidence Survey*.

Figure 4. Time-series of Aggregate Saving Rate, 1968SNA and 1993SNA



Notes: 1. Plotted figures are four-quarter moving averages.
2. "NPL adjusted 1" adds the amount of the NPL depreciation on the reconciliation accounts of households to the 93SNA disposable income, while "NPL adjusted 2" includes that of private financial corporations.
Sources: Cabinet Office, *National Accounts*.

Table A-1. Estimation Results of Consumption Growth Functions

68SNA household four-quarter consumption growth, seasonally non-adjusted

Sample period: 1983:III–1999:I

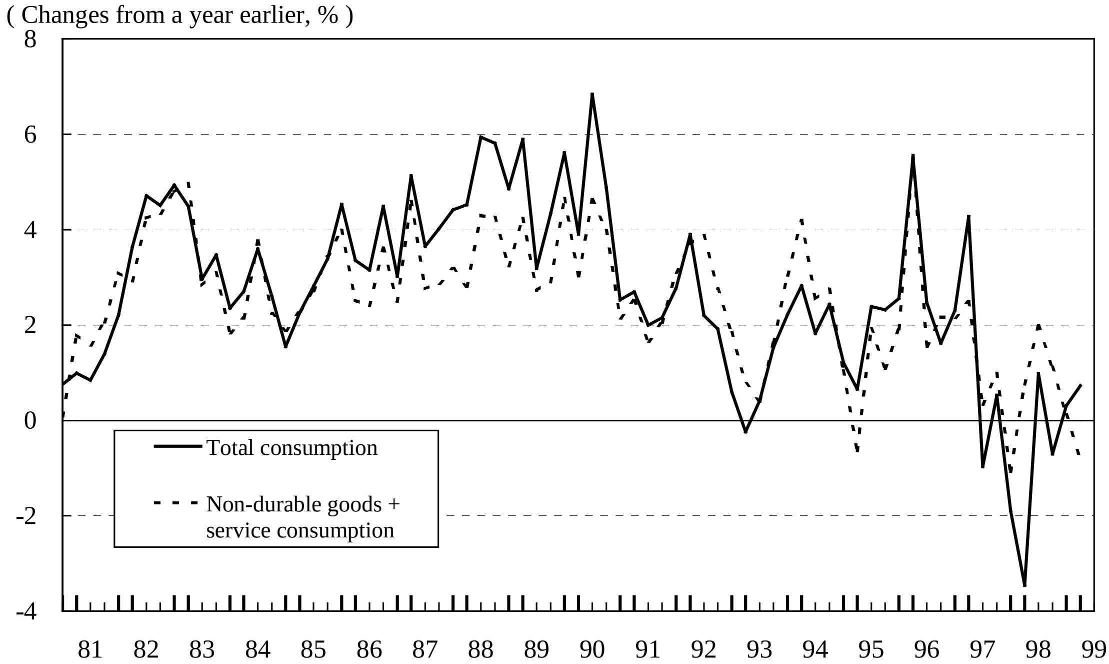
	Risk indexes									
	None	UR	AJOR	NJOR	CCI-all	CCI(1)	CCI(2)	CCI(3)	CCI(4)	CCI(5)
	[A] Total consumption									
$Risk_{-1}$	–––	–0.011	–0.001	–0.002	0.421**	0.481**	0.302**	–0.112	0.092**	0.571***
	(–––)	(0.010)	(0.010)	(0.007)	(0.170)	(0.237)	(0.127)	(0.089)	(0.038)	(0.162)
$\Delta_4 y$	0.918**	0.088	1.081***	1.167***	0.149	0.152	0.108	0.526*	0.175	0.657
	(0.418)	(0.480)	(0.335)	(0.333)	(0.373)	(0.507)	(0.348)	(0.268)	(0.343)	(0.502)
OI test	7.564	7.338	6.923	6.486	4.864	5.508	5.193	9.295	6.186	2.853
	[0.109]	[0.197]	[0.226]	[0.262]	[0.433]	[0.357]	[0.393]	[0.098]	[0.289]	[0.723]
	[B] Non-durable and service consumption									
$Risk_{-1}$	–––	–0.009**	0.009	0.004	0.310***	0.333***	0.225***	–0.146*	0.087***	0.240**
	(–––)	(0.004)	(0.008)	(0.005)	(0.119)	(0.102)	(0.066)	(0.081)	(0.034)	(0.112)
$\Delta_4 y$	0.918**	0.093	0.297	0.404	0.269	0.337	0.296	0.344**	0.278	0.471
	(0.418)	(0.244)	(0.253)	(0.254)	(0.361)	(0.392)	(0.294)	(0.171)	(0.309)	(0.314)
OI test	7.564	3.856	7.739	7.972	0.383	0.990	0.598	2.669	0.718	2.910
	[0.109]	[0.570]	[0.171]	[0.158]	[0.996]	[0.963]	[0.988]	[0.751]	[0.982]	[0.714]

Notes: 1. Estimation results are based on 2LS with the following instrumental variables: $Risk_{-5}$, $Risk_{-6}$, $\Delta_4 y_{-5}$, $\Delta_4 y_{-9}$, constant terms, and dummies.

2. Figures in parentheses are autocorrelation and heteroskedasticity-robust standard errors, while symbols ***, ** and * indicate that estimated coefficients are statistically significant at 1, 5, and 10 percent levels respectively.

3. The row labeled "OI test" reports test statistics of overidentifying restrictions, and their *p*-values in brackets.

Figure A-1. Consumption Growth



Sources: Cabinet Office, *National Accounts*.