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Subjective Probabilities of Survival: Evidence from Taiwan

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1. Introduction

Analysis of individual reports of survival probabilities has been limited. Hamermesh (1985) provides the first study about whether people's longevity expectations conform to life tables. Using two different samples, he finds that subjective longevity perceptions do not accurately correspond to actuarial distributions. The subjective distributions are flatter and exhibit greater variance. Moreover, respondents tend to base their subjective life expectancies disproportionately on relatives' longevity. Several recent studies examine the evolution of subjective longevity expectations over time based on the panel data from the Health and Retirement Study (HRS) and the Asset and Health Dynamics among the Oldest-Old Study (AHEAD). The HRS is a nationally representative sample of individuals ranged in age from 51 to 61, while the AHEAD is restricted to the older population aged 70 or older. Hurd and his colleagues provide a consistent evidence of the predictive validity of subjective probabilities on actual mortality. Hurd and McGarry (1995) find that the subjective probabilities of living to 75 or 85 are reasonably consistent with life-table probabilities. Variation in probabilities covaries with risk factors and other individual characteristics. For example, people with higher socioeconomic status (such as income, wealth and education) report higher probabilities of survival, while smokers report lower probabilities. Hurd and McGarry (2002) further use two waves of HRS and suggest that individuals modify their survival probabilities based on new information. The subjective beliefs decline with the death of a parent and respond to the new health shack – cancer.

Using the panel structure of AHEAD, Hurd, McFadden and Gan (1998) and Hurd, McFadden and Merrill (1999) find that a large fraction of unrealistic stated subjective survival probabilities what we called focal-point responses or nonresponses are associated with low cognitive performance. After controlling for sample selection bias, Hurd, McFadden and Gan (1998) find a generally strong relationship between personal survival probabilities and covariates. Males, blacks and married individuals are more optimistic than females, whites and unmarried individuals. In addition, survival expectations are positively correlated with self-rated health status and the longevity of the same-sex parental longevity. Hurd, McFadden and Merrill (1999) also confirm that subjective beliefs do respond to onset of health conditions, such as cancer, high blood pressure, diabetes and depressions.

Following the risk-updating framework proposed by Viscusi (1985), Smith et al. (2001) analyze panel data from the HRS and evaluate how exogenous health shocks impact people's longevity expectations. Their result supports the conclusion that smokers have a different risk perception process. Smokers are only sensitive to their own smoking related illness, while former smokers and those who never smoke react

to a wider range of health signals. Smith, Taylor and Sloan (2001) use a more complete version of the HRS (4 waves) to test the simple Bayesian learning model. Serious health shocks and new activity limitations are found to reduce longevity expectations, which is consistent with the previous findings.

We will address two issues in this study. First, we investigate the determinants of subjective probability of living to 75 or 85. Second, we explore how longevity expectations respond to new health information from the physical examination report. Using a panel structure of data from Taiwan, males and married individuals are more optimistic about their longevity expectations then females and single one. A U-shaped relationship is found between subjective survival probabilities and age. Income is positively correlated with probability of living to 75, whereas education has little association with survival expectations. Consistent with previous studies, the longevity of the same-sex parent heavily in forming their own survival expectations of living to 75.

Our results suggest that individuals who acquire more new health conditions from the physical examination report significantly lower probabilities of survival. The abnormalities of lipid and liver function significantly reduce the longevity expectations. While hepatitis decreases the subjective probability of living to 75, thyroid disease influences the probability of living to 85. The advice of weight control from physicians also significantly reduces individuals' subjective survival probabilities. The subjective probability of living to 75 declines with the new health shock – heart disease.

The remainder of this paper is organized as follows. The next section describes the data and measures used in this study. Section 3 describes the descriptive analysis. The empirical results are presented in section 4. Conclusions are in Section 5.

2. Data and Measures

The data used in this study come from a panel structure of health behavior survey in Taiwan, carried out at the Mackay Memorial Hospital in Taipei. The target sample comprised individuals aged 40 or more participating in the adult physical examination free-of-charge provided by Bureau of National Health Insurance, from July 2001 to December 2001. Our analysis is based on the individual's subjective perception of longevity before and after the physical examination, as well as the medical diagnosis on the physical examination report.

For completion by the respondents before the physical examinations, the first questionnaire covered socio-demographic characteristics, subjective health status, health behaviors, and longevity expectations. A next telephone interview was conducted about 2-3 months later after the respondents received the physical

examination reports from the hospital. The interview contains information on health behaviors, their follow-up attitude in case of diagnosed diseases, as well as longevity expectations. The measures of health shocks can thus be constructed as the incidence of health conditions according to the reports. Based on the questions of the first questionnaire, another supplementary data was collected from July 2002 to December 2002 at the same hospital. However, due to budget constraint, the next telephone survey was not conducted.

While the panel structure of our data provides information on the subjective health status, health behaviors and longevity expectations, the data sets have two limitations: (1) it is not a nationally representative sample, the respondents participating the physical examinations may undertake more health activities and more optimistic about their longevity expectations; (2) the interval between the two surveys was only 2-3 months, so we cannot examine the evolution of longevity expectations over a longer time horizon. We analyze two samples from the survey. The first sample conducted in 2001 survey is 700 observations, and the second one in 2002 survey is 930 observations. After excluding all individuals with incomplete information on key variables, a total of 1,390 valid observations (561 observations in 2001 survey and 829 observations in 2002) for analysis.

Socio-demographic characteristics

Socio-demographic variables collected in the first survey include age, gender, marital status, education level, employment status, occupation level and personal disposable income. With the exception of income, all of the socio-demographic variables are categorically constructed. *Age* and *age squared* are calculated to explore the nonlinear relationship between age and longevity expectations. *Male* is defined as 1 for males, and 0 for females. *Marital status* is defined as 1 if the respondent is married, otherwise 0.

According to individual years of schooling completed, we create dummy variables for three different education levels: *junior high school*, *senior high school* and *college (or above)*. The reference group is those people with only elementary education. *Personal disposable income* is measured as the logarithm of personal monthly income (or retirement payment and income from family members) in NT$ thousands.[1] We also utilize information on social background, such as parental mortality and whether the respondent is living with his/her children. As research confirms, people's subjective probabilities of survival increase with the longevity of their parents (Feinstein, 1993; Hurd and McGarry, 1995). *Parental mortality* is measured as 1 if the respondent's father or mother died, and 0 otherwise. Since men

[1] For respondents who are retired workers, housewives or unemployed, we use monthly retirement payment or income from family members as a proxy for personal income.

may be more influenced by the father's mortality experience and women more by their mother's experience, we further consider four interaction variables describing the mortality experience of the parents by sex of the respondent: *male×father died, male×mother died, female×father died, and female×mother died*.[2] *Female* is defined as 1 for females, and 0 for males. *Father died* is defined as the respondent's father has died, and *mother died* is defined as the respondent's mother has died. The reference group is those whose parents are alive. In addition, living with children may increase individual' emotional well-being and thus take more optimistic attitude about their longevity expectations. *Children* is measured as 1 if the respondent lives with their children, and 0 otherwise.

Self-reported Health Status and Diseases

It has been noted in psychological research that most people's self-conception is formed in comparison to peers (Gibbons, 1999; Mallinson, 2002). For the general perception of health, we adopted two measure of self-reported health status. One is formed in comparison to people of the same age (*subjective health status - comparing with others*); and the other is constructed as an internal comparison, comparing themselves now with their health status one year ago (*subjective health status - comparing with oneself)*). The answers to these questions are coded into a five-point scale: (1)'excellent'; (2)'good'; (3) 'fair'; (4)'worsening'; and (5) 'poor'. The two measures of subjective health status are defined as 1 if the respondent's answer is 'excellent', and 0 otherwise.

Survey participants are also asked if they have suffered from 12 diseases for the past one year. These diseases include gastric ulcer or duodenal ulcer, hepatitis, hypertension, hyperlipidemia, heart disease, asthma, diabetes mellitus, thyroid disease, gout, bladder or urethral disease, lumbago or spondylosis, and cancer or malignant. The respondent simply answers 'yes' or 'no' for these subquestions. *Self-reported diseases* is measured as the sum of 12 diseases the respondents have in their own judgement.

Health Conditions

Hospital is defined as 1 if the respondent has a hospital stay for the past one year. *Clinic* is measured as the number of going to the outpatient clinics for the past one month. *Insomnia* is measured with a question: "How often do you suffer from insomnia this year?" The answers are coded as four scale points: (1) 'no'; (2) 'occasionally'; (3) 'quite often'; (4) everyday. Insomnia is defined as 1 if the respondent's answer is 'quite often' or 'everyday'. The indicator of depressed mood is constructed based on this question: "In general, do you feel happy in your present

[2] The effect of a parent's death on longevity expectations may operate through both biological and psychological mechanisms.

life?" The answers are coded as five scale points: (1) 'very unhappy'; (2) 'unhappy'; (3) 'OK'; (4) 'happy'; (5) 'very happy'. *Unhappy* is defined as 1 if the respondent's answer is 'unhappy' or 'very unhappy'.

There is quite convincing evidence that obesity impairs health and longevity (Himes, 2000; Philipson, 2001). According to the guidelines provided by the Department of Health in Taiwan, a BMI (body mass index) ranging from 24 to 27 kg/m^2 is defined as 'overweight'; 'obesity' is defined by a BMI of more than 27 kg/m^2.[3] We measure *obesity* as 1 if the respondent is obese, otherwise 0. Since our measures of height and weight are taken from clinical records, errors arising from respondents' subjective evaluations are eliminated.[4]

Health Behaviors

Four types of health behavior are examined in this study. The exercise measure is assessed from the respondents' indication of how often they take exercise. *Exercise* is measured as 1 if a respondent exercises more than three times in the past one week, otherwise 0. *Smoke* is measured as 1 if the respondent is a current smoker, otherwise 0. *Drink* is measured as 1 if the respondent is an occasional or regular drinker, otherwise 0. *Breakfast* is measured as 1 if the respondent is in the habit of eating breakfast on a daily basis, otherwise 0.

Subjective Survival Probabilities

The pre- and post-physical examination surveys contain questions that can be interpreted as subjective probability distributions. We study responses to the following questions: "Using any number from 0 to 100 where "0" means absolutely no chance and "100" means absolutely certain, what do you think are the chances you will live to be 75 (or 85)?" After rescaling to [0, 1] we treat the responses to the questions about living to 75 (or 85) as measures of the subjective probabilities of survival (P75 and P85).

Variable definitions and summary statistics are reported in Table 1.

3. Descriptive Analysis

Figure 1 and Figure 2 display the distributions of P75 and P85 in the pre-physical examination survey. A rather large fraction of respondents give focal-point responses to the subjective survival questions: of those in our sample, 11.2 percent reported 0 for P75, 16.7 percent reported 0.5 and another 31.6 percent reported 1.0. With respect to the probability of survival to age 85, 27.1 percent of our sample reported 0 for P85, 18.2 percent 0.5, and another 14.7 percent reported 1.0. An interpretation is that people choose one of the three points according to whether they

[3] See Department of Health, Taiwan (2002): http://www.bhp.doh.gov.tw

[4] Cawley (2001) discussed the extent of reporting errors in weight and height in the National Longitudinal Survey of Youth (NLSY).

are rather confident, not confident at all, or uncertain about living to 75 (or 85). It is also possible that the bunchings reveal cognition error or misunderstanding.

Table 2 reports the average probability of surviving to age 75 (P75) and to age 85 (P85) by age range. In contrast with our expectations, women give lower average probabilities than men. For respondents in the older age groups, the subjective survival probabilities overstate survival compared with lifetable rates. Table 3 shows the distribution of responses to the health question and the averages of P75 and P85 by health status. Compared with people with the same age, most respondents rate their health as good or fair. The variation in the survival probabilities is quite large: P75 ranges from 0.33 to 0.94 among men and 0.28 to 0.83 among women. A similar pattern exists for the variation in P85.

4. Results

Table 4 reports the estimated regressions of the subjective survival probabilities on socioeconomic status, family background, health behaviors, and self-assessed health measures. As shown from the table, males are more optimistic than females and single ones. While people who live with children give higher probability of living to 75, married individuals are more optimistic about living to 85 than single ones. We find a U-shaped relationship between longevity expectations and age. However, education is insignificantly associated with subjective survival probabilities. Income has a significantly positive correlation with P75, but not P85. Among the four health behavior measures, drinking has a significantly negative correlation with P75, whereas the others have little association with longevity expectations.

The subjective probability of survival is highly correlated with self-assessed health measures. Comparing themselves to people of the same age or their memory of health status one year ago, those who reported ‘excellent’ health tend to have higher subjective probabilities of survival. Both the number of self-reported diseases and the number of going to outpatient clinics has the expected negative relationship with longevity expectations. Respondents with more self-reported diseases or those who go to the clinics more frequently give lower probabilities. People who are obese, less happy, or suffer from insomnia also more pessimistic about their longevity expectations.

The mortality experience of the parents is found to have an important and predictable relationship with P75 and P85. The coefficient of parental mortality is significant and negative, indicating that the death of father or mother reduces the individual’s subjective survival probabilities. In column 2 and column 4 of the table, we further include the interaction of dummy variables indicating the death of a mother or father with the dummy variables indicating that the respondent is male or female.

The reference group is those whose parents are alive. It shows that the decrease in P75 from the same-sex parent's death is much greater from the opposite-sex parent's death. If the respondent is male and his father has died the effect on P75 would be –0.08. If the respondent is female and her mother has died the effect on P75 would be –0.04. This result is consistent with the evidence found in U.S. by Hamermesh (1985) and Hurd, McFadden and Merrill (1999). On P85, however, the effects turn to be insignificant.

Following the risk-updating approach developed by Viscusi (1985) and Smith et al. (2001), we evaluate how new health information, acquiring through taking physical examinations, affects people's longevity expectations. The perception of longevity after the physical examination, P_t, is hypothesized to be a weighted function of a respondent's initial longevity assessment before the physical examination, P_{t-1}, along with the unobserved risk equivalent, r_t, implied by any new health information that motivated the revision. The posterior assessment of individuals' odds of living to 75 or 85, P_t, is a weighted average of prior beliefs, scaled by the relative 'information" associated with their prior believes ($\theta/(\theta+\gamma)$) and the new information, expressed as a risk equivalent, r_t, weighted by the relative precision ($\gamma/(\theta+\gamma)$) as follows:

$$P_t = \frac{\theta P_{t-1} + \gamma r_t}{\theta + \gamma} \qquad (1)$$

Our primary hypothesis is that the physical examination report provides new information inducing a revising of a respondent's subjective survival probability. The physical examination report contain information on the outcomes of seven test items, six diagnosed diseases, and five physician advices. The seven test items include urinalysis, complete blood count, blood sugar, liver function, renal function, lipid, and uric acid. The six diagnosed diseases are hypertension, thyroid disease, heart disease, hepatitis, hyperlipidemia, and gout. The five advices from physicians are quit smoking, quit drinking, oral hygiene, weight control, and diet and nutrition. Health shocks, which frequently used in the literature of longevity expectations, represent the onset of new health conditions. For example, if a respondent did not report a hypertension in the pre-physical examination survey, and hypertension was reported in the physical examination report, this is recorded as a health shock. Matching the self-reported diseases in the pre-physical examination survey and the diseases by medical diagnosis on the physical examination reports, we can construct the incidence of new health conditions. In addition, four aggregate measures of health information can be constructed as the sum of abnormal test outcomes, the sum of diagnosed diseases, the sum of physician advices, and the sum of health shocks.

Table 5-7 report the simple Bayesian updating model used to describe the

updates of longevity expectations between pre- and post-physical examination survey. The coefficients of P75 (or P85) in the pre-physical examination survey are all significantly and positively correlated with the subjective survival probabilities in the post-physical examination survey. The findings offer clear support for some form of connection between prior and posterior longevity expectations.

Table 5 and Table 6 explore how the new information on test outcomes, disease conditions and physician advices affect subjective probability of living to 75 and 85. Column 1 in the two tables shows that the abnormalities of lipid and liver function significantly reduce the longevity expectations. While hepatitis decreases the subjective probability of living to 75, thyroid disease influences the probability of living to 85. Among the physician advices, weight control is the only new information that significantly reduces the subjective survival probabilities.[5] For the aggregate measures of health conditions, column 4 to column 6 in Table 5 indicate that respondents who have more abnormal test outcomes, diagnosed diseases and physician advices significantly decrease their subjective probability of living to 75. With the exception of the sum of diagnosed diseases, similar results are found for the probability of living to 85 in Table 6. With respect to the socio-demographic variables, in contrast with the pre-physical examination survey, men revise their expectations and report lower subjective survival probabilities than women. Again, married individuals are shown to be more optimistic.

To the extent that the onset of new condition provides new information about survival chances, we expect the health shock should reduce the subjective survival probabilities. Table 7 presents the impact of new health shocks on subjective survival probabilities. As column 1 shows, with the exception of heart disease, all the coefficients of health conditions are not significantly different from zero. Having a heart disease is associated with a reduction in the subjective probability for living to 75 of 0.19. However, there is little association between health shocks and subjective probability of living to 85. The sum of health shocks is only insignificantly correlated with longevity expectations. Overall, our results confirm that longevity expectations do respond negatively to new health information.

5. Conclusions

This paper examines the determinants of subjective survival probabilities and explores how longevity expectations respond to new health information. Our analysis is based on the individual's subjective perception of longevity before and after the

[5] The reference group for test outcomes in column 1 is urinalysis. The reference group for disease conditions in column 2 is hypertension and the reference group for physician advices in column 3 is quit smoking.

physical examination, as well as the medical diagnosis and physician advices from the physical examination report. Using a panel structure of data from Taiwan, males and married individuals appear to be more optimistic about their longevity expectations then females and single one. A U-shaped relationship is found between subjective survival probabilities and age. Income is positively correlated with probability of living to 75, whereas education has little association with survival expectations. Consistent with previous studies, the longevity of the same-sex parent heavily in forming their own survival expectations of living to 75.

Our findings support the simple Bayesian learning model to describe how individuals use new health information to revise their longevity expectations. Following the risk-updating framework by Viscusi (1985) and Smith et al. (2001), we find that the abnormalities of lipid and liver function significantly reduce the longevity expectations. While hepatitis decreases the subjective probability of living to 75, thyroid disease influences the probability of living to 85. The advice of weight control from physicians also significantly reduces individuals' subjective survival probabilities. The subjective probability of living to 75 declines with the new health shock – heart disease. The results suggest that individuals who acquire more new health conditions from the physical examination report significantly lower probabilities of survival.

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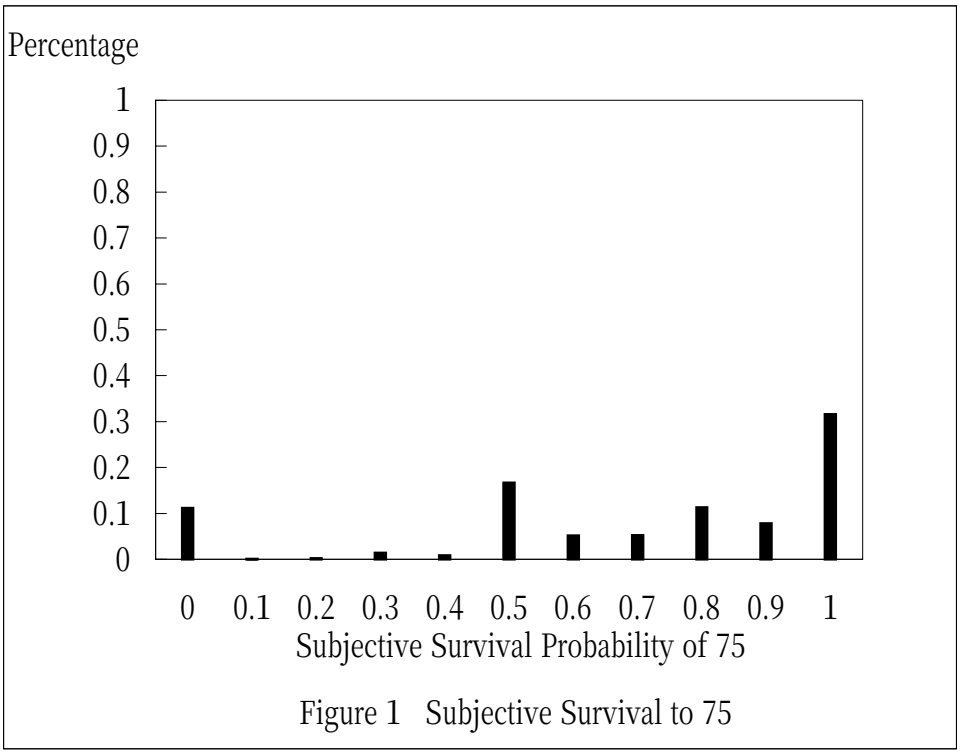

Figure 1 Subjective Survival to 75

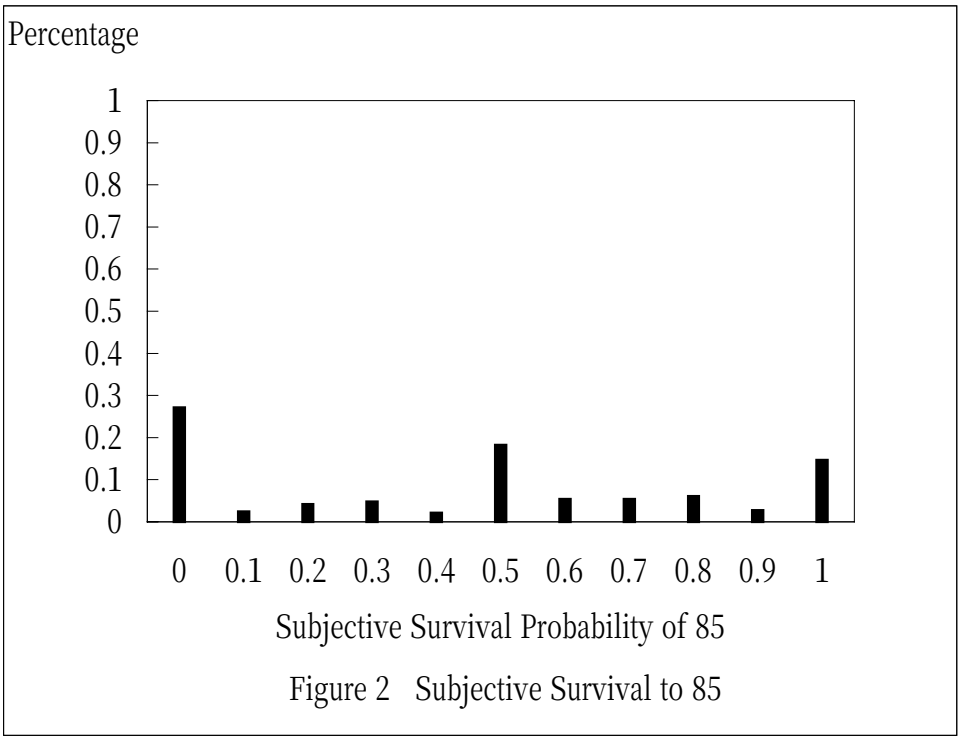

Figure 2 Subjective Survival to 85

Table 1 Variable Definitions and Summary Statistics

Variable	Definition	Mean (std. dev.)
Subjective survival probability		
P75	Subjective probability of living to 75.	0.702 (0.32)
P85	Subjective probability of living to 85.	0.464
Socio-demographic characteristics		
Age	Age.	50.95 (8.30)
Age squared	Age squared/100.	26.65 (9.26)
Male	1 if respondent is male, 0 otherwise.	0.340 (0.47)
Marital status	1 if the respondent is married, 0 otherwise.	0.799 (0.40)
Junior high school	1 if the respondent's education level is junior high school, 0 otherwise.	0.134 (0.34)
Senior high school	1 if the respondent's education level is senior high school, 0 otherwise.	0.286 (0.45)
College (or above)	1 if the respondent's education level is college or graduate school, 0 otherwise.	0.330 (0.47)
Personal disposable income	Log of personal monthly income (NT$1000, 1US$=35NT$).	2.838 (1.47)
Parental mortality	1 if the respondent's father or mother died, 0 otherwise.	0.716 (0.45)
Father died	1 if the respondent's father died, 0 otherwise.	0.660 (0.47)
Mother died	1 if the respondent's mother died, 0 otherwise.	0.412 (0.49)
Children	1 if the respondent lives with their children, 0 otherwise.	0.768 (0.42)
Self-reported health status and diseases		
Subjective health status – comparing with others	1 if the respondent's health status is "excellent" in Comparison to people of the same age, 0 otherwise.	0.066 (0.25)
Subjective health status – comparing with oneself	1 if the respondent's health status is "excellent" in Comparison to that one year ago, 0 otherwise.	0.057 (0.23)
Self-reported disease	The sum of 12 diseases the respondents have in their own judgement.	1.217 (1.39)
Health conditions		
Hospital	1 if the respondent has a hospital stay for the past one year, 0 otherwise.	0.054 (0.23)
Clinic	The number of the respondent going to the outpatient clinics for the past one month, 0 otherwise.	0.875 (1.34)
Insomnia	1 if the respondent suffer s from insomnia "quite often" or "every day", 0 otherwise.	0.200 (0.40)
Unhappy	1 if the respondent is "unhappy" or "very unhappy", 0 otherwise.	0.065 (0.25)
Obesity	1 if the respondent is obese, 0 otherwise.	0.117 (0.32)
Health behaviors		
Exercise	1 if the respondent exercises more than three times in the past one week, 0 otherwise.	0.668 (0.47)
Smoke	1 if the respondent is a current smoker, 0 otherwise.	0.142 (0.35)
Drink	1 if the respondent is an occasional or regular drinker, 0 otherwise.	0.177 (0.38)
Breakfast	1 if the respondent is in the habit of eating breakfast on a daily basis.	0.691 (0.46)

Table 2 Average Probabilities of Living to 75 or 85

	Male		Female		All	
Age range	P75	P85	P75	P85	P75	P85
Age 40-44	0.74	0.48	0.62	0.39	0.66	0.42
Age 45-49	0.76	0.51	0.67	0.43	0.70	0.46
Age 50-54	0.77	0.54	0.67	0.44	0.70	0.47
Age 55-59	0.76	0.55	0.60	0.35	0.66	0.42
Age 60+	0.79	0.59	0.80	0.51	0.80	0.54

Table 3 Average Probabilities of Living to 75 or 85: Subjective Health Status – Comparing with Others

	Male		Female		All	
Health status	P75	P85	P75	P85	P75	P85
Excellent	0.94	0.68	0.83	0.66	0.88	0.67
Good	0.88	0.64	0.79	0.55	0.82	0.59
Fair	0.73	0.49	0.67	0.41	0.69	0.44
Worsening	0.63	0.43	0.54	0.31	0.57	0.35
Poor	0.33	0.18	0.28	0.12	0.29	0.13

Table 4 Determinants of Subjective Survival Probabilities

	P75	P75	P85	P85
Constant	0.8957	0.8839	1.1411	1.1369
	(3.41)***	(3.37)***	(3.62)***	(3.60)***
Socio-demographic characteristics				
Age	-0.0161	-0.0167	-0.0313	-0.0322
	(-1.68)*	(-1.75)*	(-2.74)***	(-2.82)***
Age squared	0.0205	0.0219	0.0339	0.0352
	(2.41)**	(2.57)***	(3.33)***	(3.47)***
Male	0.0626	0.1117	0.0700	0.1057
	(3.00)***	(3.40)***	(2.73)***	(2.61)***
Marital status	0.0319	0.0316	0.0531	0.0538
	(1.41)	(1.40)	(1.91)*	(1.94)**
Junior high school	-0.0293	-0.0268	-0.0265	-0.0239
	(-1.02)	(-0.94)	(-0.75)	(-0.68)
Senior high school	0.0140	0.0134	-0.0287	-0.0272
	(0.57)	(0.54)	(-0.94)	(-0.89)
College (or above)	0.0171	0.0152	-0.0004	-0.0004
	(0.68)	(0.60)	(-0.01)	(-0.01)
Personal disposal income	0.0130	0.0133	0.0067	0.0067
	(2.08)**	(2.12)**	(0.86)	(0.86)
Parental mortality	-0.0414		-0.0450	
	(-2.16)**		(-1.91)*	
Male × Father died		-0.0806		-0.0423
		(-2.56)***		(-1.11)
Male × Mother died		-0.0369		-0.0002
		(-1.21)		(-0.01)
Female × Father died		-0.0040		-0.0518
		(-0.18)		(-1.41)
Female × Mother died		-0.0433		-0.0345
		(-1.93)**		(-1.26)
Children	0.041	0.0421	0.0103	0.0113
	(1.91)*	(1.97)**	(0.39)	(0.43)
Self-reported health status and diseases				
Subjective health status	0.1271	0.1271	0.1614	0.1642
- comparing with others	(3.83)***	(3.83)***	(3.88)***	(3.95)***
Subjective health status	0.0474	0.0488	0.0845	0.0867
- comparing with oneself	(1.34)	(1.38)	(1.95)**	(2.00)**
Self-reported diseases	-0.0129	-0.0134	-0.0210	-0.0217
	(-2.12)**	(-2.22)**	(-2.84)***	(-2.94)***

Table 4 Determinants of Subjective Survival Probabilities (Continued)

	P75	P75	P85	P85
Health conditions				
Hospital	-0.0384	-0.0388	-0.0062	-0.0060
	(-1.05)	(-1.07)	(-0.13)	(-0.13)
Clinic	-0.0111	-0.0107	-0.0150	-0.0149
	(-1.76)*	(-1.70)*	(-1.98)**	(-1.96)**
Insomnia	-0.0696	-0.0706	-0.0468	-0.0473
	(-3.28)***	(-3.33)***	(-1.82)*	(-1.83)*
Unhappy	-0.1324	-0.1342	-0.1130	-0.1109
	(-3.83)***	(-3.89)***	(-2.67)***	(-2.62)***
Obesity	-0.0495	-0.0520	-0.0151	-0.0173
	(-1.91)*	(-2.02)**	(-0.48)	(-0.55)
Health behaviors				
Exercise	0.0289	0.0279	-0.0026	-0.0039
	(1.62)	(1.57)	(-0.12)	(-0.18)
Smoke	0.0219	0.0175	0.0322	0.0294
	(0.83)	(0.66)	(1.01)	(0.91)
Drink	-0.0431	-0.0446	-0.0238	-0.0272
	(-1.81)*	(-1.88)*	(-0.82)	(-0.93)
Breakfast	0.0238	0.0237	0.0062	0.0063
	(1.28)	(1.27)	(0.27)	(0.27)
R^2	0.12	0.13	0.10	0.10
N	1390	1390	1229	1229

Note: Figures in parenthesis are t-statistics. ***, ** and * represent statistical significance at 1%, 5% and 10% level, respectively.

Table 5 Risk Updating Model for Live to 75 in Survey 2 – The Impact of Test Outcomes, Disease Conditions and Physician Advices

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.3632	0.3551	0.3564	0.3657	0.3310	0.3819
	(4.99)***	(4.94)***	(4.65)***	(5.11)***	(4.61)***	(5.21)***
P75 in survey 1	0.2377	0.2403	0.2443	0.2360	0.2403	0.2398
	(9.06)***	(9.18)***	(9.29)***	(9.06)***	(9.23)***	(9.20)***
Test outcomes						
Complete blood count	-0.0064					
	(-0.37)					
Liver function	-0.0379					
	(-1.93)**					
Blood sugar	0.0237					
	(0.59)					
Lipid	-0.0307					
	(-1.69)*					
Renal function	0.0018					
	(0.04)					
Uric acid	0.0055					
	(0.21)					
Disease conditions						
Thyroid disease		-0.0624				
		(-1.59)				
Heart disease		-0.0348				
		(-0.79)				
Hepatitis		-0.0558				
		(-1.84)*				
Hyperlipidemia		-0.0253				
		(-0.61)				
Gout		-0.0545				
		(-0.50)				
Physician Advices						
Quit drinking			-0.0066			
			(-0.20)			
Oral hygiene			-0.0249			
			(-1.19)			
Weight control			-0.0374			
			(-2.24)**			
Diet and nutrition			0.0002			
			(0.01)			
Sum of abnormal test items				-0.0188		
				(-2.57)***		
Sum of diagnosed diseases					-0.0321	
					(-2.36)**	
Sum of physician advices						-0.0161
						(-2.06)**
Socio-demographic characteristics						
Age	0.0002	0.0003	0.0004	0.0005	0.0008	0.0001
	(0.20)	(0.27)	(0.31)	(0.42)	(0.68)	(0.06)
Male	-0.0739	-0.0808	-0.0720	-0.0802	-0.0809	-0.0687
	(-3.87)***	(-4.53)***	(-3.82)***	(-4.52)***	(-4.55)***	(-3.64)***
Marital status	0.0497	0.0499	0.0506	0.0507	0.0492	0.0475
	(2.36)**	(2.38)**	(2.41)**	(2.44)**	(2.36)**	(2.28)**
Junior high school	0.0264	0.0203	0.0240	0.0256	0.0232	0.0236
	(0.89)	(0.68)	(0.82)	(0.88)	(0.79)	(0.81)
Senior high school	0.0322	0.0254	0.0276	0.0310	0.0273	0.0294
	(1.31)	(1.02)	(1.12)	(1.26)	(1.11)	(1.19)
College (above)	-0.0036	-0.0050	-0.0089	-0.0084	-0.0049	-0.0092
	(-0.15)	(-0.21)	(-0.38)	(-0.36)	(-0.21)	(-0.39)
R^2	0.16	0.16	0.16	0.16	0.16	0.16
N	596	596	596	596	596	596

Note: See Table 4.

Table 6 Risk Updating Model for Live to 85 in Survey 2 – The Impact of Test Outcomes, Disease Conditions and Physician Advices

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.2297	0.2354	0.2002	0.2367	0.2154	0.2623
	(2.67)***	(2.76)***	(2.22)**	(2.79)***	(2.53)***	(3.03)***
P85 in survey 1	0.0860	0.0884	0.0945	0.0904	0.0875	0.0896
	(3.26)***	(3.34)***	(3.60)***	(3.46)***	(3.32)***	(3.43)***
Test outcomes						
Complete blood count	0.0105					
	(0.51)					
Liver function	-0.0320					
	(-1.35)					
Blood sugar	0.0004					
	(0.01)					
Lipid	-0.0440					
	(-2.01)**					
Renal function	0.0252					
	(0.53)					
Uric acid	0.0033					
	(0.10)					
Disease conditions						
Thyroid disease		-0.0885				
		(-1.85)*				
Heart disease		0.0242				
		(0.46)				
Hepatitis		-0.0393				
		(-1.09)				
Hyperlipidemia		-0.0326				
		(-0.66)				
Gout		-0.0123				
		(-0.10)				
Physician Advices						
Quit drinking			-0.0539			
			(-1.35)			
Oral hygiene			-0.0399			
			(-1.60)			
Weight control			-0.0418			
			(-2.08)**			
Diet and nutrition			0.0266			
			(1.21)			
Sum of abnormal test items				-0.0193		
				(-2.19)**		
Sum of diagnosed diseases					-0.0130	
					(-0.80)	
Sum of physician advices						-0.0196
						(-2.10)**
Socio-demographic characteristics						
Age	-0.0028	-0.0009	-0.0004	-0.0006	-0.0006	-0.0011
	(-0.55)	(-0.65)	(-0.29)	(-0.41)	(-0.40)	(-0.74)
Male	-0.1000	-0.1095	-0.0929	-0.1094	-0.1100	-0.0949
	(-4.35)***	(-5.08)***	(-4.10)***	(-5.10)***	(-5.12)***	(-4.18)***
Marital status	0.0771	0.0713	0.0737	0.0742	0.0724	0.0714
	(3.02)***	(2.80)***	(2.92)***	(2.94)***	(2.86)***	(2.83)***
Junior high school	0.0224	0.0250	0.0288	0.0271	0.0242	0.0244
	(0.62)	(0.69)	(0.81)	(0.76)	(0.68)	(0.69)
Senior high school	0.0205	0.0186	0.0172	0.0200	0.0190	0.0178
	(0.69)	(0.62)	(0.58)	(0.67)	(0.64)	(0.60)
College (above)	-0.0065	-0.0033	-0.0074	-0.0092	-0.0058	-0.0112
	(-0.23)	(-0.12)	(-0.26)	(-0.33)	(-0.20)	(-0.40)
R^2	0.09	0.09	0.09	0.09	0.08	0.08
N	586	586	586	586	586	586

Note: See Table 4.

Table 7 Risk Updating Model for Live to 75 and 85 in Survey 2
– The Impact of Health Shocks

	P75 in survey 2		P85 in survey 2	
	(1)	(2)	(3)	(4)
Constant	0.3452	0.3484	0.2201	0.2200
	(4.78)***	(4.82)***	(2.56)***	(2.57)***
P75 in survey 1	0.2397	0.2360		
	(9.10)***	(8.97)***		
P85 in survey 1			0.0898	0.0893
			(3.37)***	(3.37)***
Health shocks				
Thyroid disease	-0.0476		-0.0560	
	(-0.90)		(-0.85)	
Heart disease	-0.1879		-0.1175	
	(-2.43)**		(-1.27)	
Hepatitis	-0.0214		0.0005	
	(-0.50)		(0.01)	
Hyperlipidemia	-0.0482		-0.0334	
	(-0.44)		(-0.26)	
Gout	0.1045		0.0423	
	(0.55)		(0.19)	
Sum of health shocks		-0.0390		-0.0226
		(-1.39)		(-0.67)
Socio-demographic characteristics				
Age	0.0004	0.0004	-0.0007	-0.0008
	(0.34)	(0.31)	(-0.50)	(-0.53)
Male	-0.0862	-0.0853	-0.1153	-0.1148
	(-4.80)***	(-4.74)***	(-5.30)***	(-5.29)***
Marital status	0.0505	0.0511	0.0738	0.0753
	(2.39)**	(2.43)**	(2.86)***	(2.94)***
Junior high school	0.0214	0.0227	0.0221	0.0239
	(0.72)	(0.77)	(0.61)	(0.66)
Senior high school	0.0340	0.0328	0.0250	0.0245
	(1.37)	(1.32)	(0.83)	(0.82)
College (or above)	-0.0012	-0.0016	-0.0020	-0.0025
	(-0.05)	(-0.07)	(-0.07)	(-0.09)
R^2	0.16	0.15	0.08	0.08
N	596	596	586	586

Note: See Table 4.