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BELIEFS ABOUT FUTURE HEALTH AND THE DEMAND FOR HEALTH AND HEALTH INSURANCE

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Abstract

Beliefs about future health should play an important role in determining current health decisions. In theory, the direction of the effect of differences in expectations for longevity on health investments is unclear. Greater optimism may make current health investments either more or less appealing. OLS estimates using data from the Health and Retirement Study show that beliefs about longevity are only weakly associated with current health decisions after conditioning a number of other demographic and economic characteristics. Problems of reverse causality and omitted variables imply that these OLS estimates may be misleading. An individual's index of general optimism, measured as the tendency to answer questions about macroeconomic and policy events optimistically, is not subject to the reverse causality problem. There is a statistically significant and relatively large positive association between general optimism and most health investments. As an instrument for beliefs about future health, however, the index of optimism is weak. Therefore, IV estimates indicating that more optimistic beliefs about future health substantially increase the likelihood of making most health investments are difficult to interpret.

1 Introduction

Many millions of Americans go without health insurance, and many more do not make what would appear to be high return investments in their health.[1] A potential source of the variation in these health decisions is individual differences in beliefs about future health. It may be that those who decline to purchase (sign up for free) health insurance, or make no effort to lose extra weight are unusually sanguine about their health. Alternatively, those who forgo health screenings or fail to quit smoking may be particularly pessimistic, thinking that their future poor health is unavoidable and therefore not worth the effort to improve. Somewhat more generally, differences in beliefs about future health may have two different effects on health decisions. On the one hand, if a person thinks he is *likely* to enjoy long life and good health, regardless of his actions, the value of investments in health is limited. On the other hand, if a person believes he is *unlikely* to enjoy long life and good health, despite his best efforts, the value of investments in health and health insurance is also limited. This latter influence of beliefs on health decisions is sometimes called the Mickey Mantle Effect, named for the New York Yankee centerfielder who is credited with saying "If I knew I'd live this long, I would have taken better care of myself."[2] As will be made clear below, which of these two effects will be most empirically relevant will depend on the relationship between prior beliefs about future health and the size of the health gain from investment.

Despite their potential importance in determining behavior, evidence of the relationship between of subjective beliefs about future health and current health behaviors has been limited and often indirect. Hamermesh (1985), for example, studied the average accuracy of expectations for longevity. Viscusi (1990) examined the relationship between beliefs about

[1] The recent and rapid increase in obesity rates in the U.S., rising from 15% to 31% between 1976 and 2000, (Flegal et al., 2002), provides indirect evidence of limited health investments. In addition, there is substantial evidence of low rates of participation in routine, low-money cost health investments that substantially diminish the likelihood of serious disease and hospitalization. See, e.g., Simoes, et al. (1999) on cervical cancer screening; Garattini, et al. (1996) on skin cancer screening, and Aizer (2002) on preventive care more generally.

[2] Mantle died in 1995 at age 64, shortly after a liver transplant. Infamous for his hard drinking, late nights, and lax training, Mantle attributed his inattention to health to the fact that he had always anticipated an early death like that of his father and other male relatives.

the health risks of smoking, and smoking behavior. In another example, Smith, et al. (2001) looked at the responsiveness of longevity expectations to changes in health conditions. In a spirit most similar to the present analysis, Hurd, et al. (2002) examine the effect of expectations for longevity on the decision to retire.

In the past, an important obstacle to describing the relationship between beliefs and behavior was the lack of data on health expectations. More fundamentally, estimating the relationship between beliefs and health decisions is made difficult by two problems: (1) the potential correlation of beliefs with unobserved variables that independently influence health decisions, and (2) the (reverse) causal effect of investment decisions on beliefs. The reverse causality problem derives from the fact that current health decisions should, in part, determine expectations for future health and longevity.

This paper exploits the rich data on expectations for future health and on health investment and insurance choices now available in the Health and Retirement Study (HRS) to investigate the relationship between beliefs about future health and current health decisions. The investigation has three parts. First we simply describe the empirical relationship between beliefs about longevity and various health decisions. Second, we construct measures of general optimism derived from the answers to questions regarding the likelihood of macroeconomic, Social Security policy, and weather events, and estimate the relationship between current health decisions and general optimism. The construction of these optimism measures is based on a notion that there is fundamental and systematic variation in individuals' prior beliefs about the likelihood of good (or bad) events.[3] Individuals who are otherwise the same in ways that matter for health decisions may have different beliefs about the likelihood of future states of the world. Some will tend to be relatively pessimistic and others relatively optimistic.[4] We use two techniques to estimate an individual's tendency for optimism. Following Kezdi and Willis (2003), the first technique relies on factor analysis to isolate a common index from responses to expectations questions about macroeconomic and Social

[3]This is a notion articulated by psychologists such as Seligman (1988, 2000), and Peterson, et al.(1988), and reflected in studies including Maruta, et al. (2000) and Danner, et al. (2001).

[4]In many domains, the average person tends toward optimistic beliefs relative to objective probabilities. See, e.g., Larwood and Whittaker (1977), Svenson (1981) and Gilovich (1983). For low probability events, however, the tendency is often towards overpessimism. See Vicusi (1990) for an example.

Security policy events. Ex-post, that factor turns out to be positively correlated with higher expectations for "good" macro events. The second technique follows Bassett and Lumsdaine (2001) by combining an HRS warm up question on expectations for sunshine with actual weather data and calculating deviations from average and from rational expectations.

In the third part of the paper, the notion of fundamental optimism motivates an instrumental variables (IV) approach to estimating the relationship between beliefs about future health and current health decisions. In an attempt to deal both with the omitted variable and the endogeneity problems, we instrument for beliefs about future health with our measures of general optimism. The IV approach will provide consistent estimates of the average effect of beliefs on health decisions if the measures of optimism capture the fundamental variation in prior beliefs, and are associated with health decisions only because they affect expectations about future health. Less satisfying, the IV approach should provide more consistent estimates than would ordinary least squares if the instruments are sufficiently strong predictors of beliefs about future health.

The first set of results indicate that beliefs about longevity are only weakly associated with current health decisions after conditioning on a number of observables. We find no statistically significant relationship between expectations for living to age 75 and decisions to obtain health insurance coverage, participate in vigorous physical activities, or get health screenings. Only smokers hold statistically more pessimistic beliefs about longevity than non-smokers. There is, however, a statistically significant, and sometimes relatively large, positive association between our measures of general optimism and the decision to obtain health insurance and with most health investments. Those who have an underlying tendency for optimism are also more likely to invest in health. As instruments for beliefs about future health, however, our measures of optimism are weak. While they have a statistically significant and relatively sizeable association with beliefs about future longevity and health, they explain relatively little of the variation in those beliefs conditional on a number of observable characteristics of the respondents. For this reason, the IV results must be interpreted with particular caution.[5] With this caution in mind, the IV estimates indicate that the Mickey

[5] With weak instruments, the bias of the IV estimator may be worse than that of the OLS estimator. See Bound, et al. (1995) for a clear exposition of the problems associated with weak instruments.

Mantle Effect is the most empirically relevant. We estimate that more optimistic beliefs about future health increase the likelihood of obtaining health insurance and making most health investments. In the HRS, those who are more optimistic about their longevity are more likely to obtain health insurance, undertake cancer screenings and avoid smoking.

While these results must be interpreted with care, they suggest that policy-makers interested in increasing health investments by influencing beliefs should consider experimenting with somewhat unconventional information campaigns. Traditional information campaigns have emphasized the importance of health decisions for longevity and future health. Examples include anti-smoking campaigns that present pictures of lungs damaged by cancer or emphysema, and healthy eating campaigns that relate obesity to Type II diabetes and heart disease. An alternative campaign, suggested by these results, would emphasize how recent increases in life expectancies have increased value of current health investments. Such a campaign would draw attention to the fact that good health in old age should be more important now that old age lasts considerably longer than it did in even the recent past.[6]

2 How Beliefs About Health May Influence Health Investments

In this section we present a simple model of dynamic choice under uncertainty to describe the basic ways in which beliefs about future health may influence decisions to invest in health or health insurance. This basic framework will abstract from much of what is important for decisions about health and health insurance but will make clear the different effects of greater optimism on these decisions. The model is focused on beliefs about future longevity, but may be easily adapted to apply to beliefs about future health quality.

Consider an agent who may live two periods: the present and the future. In the present, the agent must choose whether to make an investment in health. This investment may represent the decision to undertake preventive health measures such as eating healthy food, quitting smoking, getting a cancer screening, or exercising regularly. Alternatively, we may

[6]Expected lifetimes at birth have increased by nearly 8 years since 1960. See, Vital Statistics (2003).

interpret this investment as a decision to acquire health insurance that facilitates preventive health measures and limits the negative effects of illness or injury.

Let the decision to invest be denoted by $d \in \{0,1\}$, where 0 represents a decision not to invest, and 1 a decision to invest. The decision to invest is associated with a one-time immediate utility cost, c. Let $u(d)$ denote the agent's utility in each period as a function of the decision to invest. The investment provides the agent a direct health gain so that $u(1) > u(0)$. The direct gain from investment $[u(1) - u(0)]$ is denoted by Δu and is assumed to be less than c since otherwise the decision is trivial.

The investment in health improves not only the quality of health in each period, but also the perceived probability of survival from the present to the future. Thus if the prior belief about survival is given by π, then the probability of survival conditional on investing is given by $p(\pi)$ where $p'(\cdot) > 0$ and $p(\pi) \geq \pi$.[7]

If the agent places a relative weight δ on utility received in the future then the agent's expected lifetime utility as a function of the investment decision is given by

$$V(d) = u(d) - dc + \delta[(1-d)\pi + dp(\pi)]u(d)$$

and he chooses to invest if $V(1) \geq V(0)$. Equivalently, the agent invests if:

$$\Delta u + \delta\pi\Delta u + \delta u(1)[p(\pi) - \pi] \geq c \tag{1}$$

where the left hand side of inequality (1) represents the expected benefit of investment and the right hand side the certain cost.

Expression (1) shows how the expected benefit of investment has three sources. The first term on the left-hand side represents the present period gain in health utility that comes from investment. The second term on the left-hand side is the discounted expected future gain in health utility that would obtain even if longevity were unaffected, i.e. even if $p(\pi) = \pi$. The second component represents the expected additional gain in health utility that obtains because expectations for longevity are increased. We will denote the total expected benefit of investment by b.

Now suppose that an individual's cost of investment is a random variable drawn from a distribution described by a CDF $F(\cdot)$ that is unrelated to the distribution of priors. In

[7] We assume, for simplicity, that this direct gain Δu does not depend on the prior about survival π.

this case, the likelihood of an investment is given by $F(b)$, i.e., the proportion of agents for whom the cost of investment c is less than the expected benefit b. It then follows from the expression for b on the left hand side of inequality (1) that investment is, naturally, less likely when when the direct health benefit from investment Δu is lower. The influence of differences in the prior on the likelihood of investment are more subtle.

The partial derivative the right hand side of inequality (1) with respect to the prior is given by

$$\delta \left[p'(\pi) u(1) - u(0) \right].$$

The influence of prior longevity beliefs on the probability of health investment thus depends, most basically, on the sign of $[p'(\pi) u(1) - u(0)]$ and the probability of investment is increasing in the prior if

$$p'(\pi) \geq \frac{u(0)}{u(1)} \tag{2}$$

and strictly decreasing, otherwise.

This simple framework thus makes clear the competing effects of a prior for greater longevity. On the one hand living longer increases the value of the improved health that comes from earlier investments and thus make such investments more attractive. On the other hand, if living longer means the incremental effect of investment on longevity is small, then the relative value of investment is also small. The nature of beliefs about the longevity gains from investment are restricted somewhat by theory in that $p(\pi)$ is assumed to map into $[\pi, 1]$, but otherwise the shape of this function is not obvious. Which influence of differences in beliefs is the most relevant for the typical decision maker is therefore an empirical question.

3 Data

Our empirical analysis relies on the Health and Retirement Study (HRS), a nationally representative, longitudinal survey of 9,825 older Americans first interviewed in 1992 when they were age 51-61. Respondents and their spouses were reinterviewed every two years thereafter. The latest wave used in our analysis is 2000, though most of our study concerns decisions made in 1992. The HRS is uniquely suited for a study of the relationship between

beliefs and health behavior because it reports detailed information on a wide range of health and expectation topics.[8]

The HRS permits analysis of a variety of health-related decisions and outcomes. The decisions of greatest interest for our study are the decision to obtain health insurance and the decision to invest in various preventive health measures including participating in physical activity, not smoking, and having certain health screenings. Detailed descriptions of these outcome variables and descriptions of the conditioning variables used in our analysis are provided in Table A1 of the appendix.[9]

Our emphasis is on the role played by expectations for future longevity in determining the decision to obtain health insurance or make other health decisions. The HRS collects information on longevity expectations by asking:

> "(What is the percent chance) that you will live to be 75 or more?" and subsequently "(What is the percent chance) that you will live to be 85 or more?"[10]

Using the responses to these sets of questions we examine the relationship between beliefs about future longevity on decisions to invest in health and health insurance.[11]

To estimate an individual's tendency for general optimism we rely on a set of questions that solicit expectations for macroeconomic, Social Security policy, and weather events. Different sets of questions were asked in different HRS waves, but two were repeated in each wave:

> "What is the percent chance that the U.S. economy will experience double-digit inflation sometime in the next 10 years or so?" and subsequently

[8] See Juster and Suzman (1995) for a detailed description of the HRS.

[9] When possible, the analysis relies on HRS extracts provided by RAND. These extracts impute missing values for demographic variables, which we include in the analysis. The variables which include imputed values are noted in Table A1.

[10] Respondents reply with a number that is either between 0 and 10, or between 0 and 100, depending on the wave.

[11] We have also examined the relationship between health decisions and expecations for future disability measured as the belief that bad health will limit the ability to work. The basic patterns of that analysis track those concerning longevity beliefs quite closely.

> "What do you think are the chances that the U.S. economy will experience a major depression sometime during the next 10 years or so?"

In addition, in all but the second wave, respondents were asked

> "[What are the chances] that congress will change Social Security so that it becomes less generous than now?"

Finally, in 1994 and 2000, as a warm-up question for the expectations section of the survey, respondents were asked to provide their expectations for the next day's weather. In 1994 this warm-up question asked:

> "Weather forecasters often say something like "There's a 10-20 percent chance of rain tomorrow," meaning there's not much chance that it will rain. Using the same idea, what do you think the chances are that it will be sunny tomorrow?"

These four macroeconomic, policy and weather questions, plus two additional questions asked only in the first wave[12] form the bases of our general optimism measures. The details of the procedures used to calculate these measures are provided in section 5.

4 Optimistic Longevity Beliefs and Health Decisions

Our basic approach is to estimate empirical models describing the probability of making various health decisions as a linear function of beliefs and a number of observable economic, demographic and health variables. Taking a first cut at the data, Table 1, compares the average values of the longevity expectations and the various economic, demographic and health variables of respondents making different health decisions. The insurance, exercise, and smoking decisions represent the respondents' decisions in 1992 and the conditioning variables are measured as of the first wave. The cancer screening decisions were as of 1996, and the conditioning variables are measured as of the third wave.

[12] In the first wave respondents were also asked about the chances congress would change Social Security so that it becomes more generous than now, and about the chances that home prices in their neighborhood would rise faster than inflation over the next 10 years.

With respect to expectations, these comparisons of means indicate that those who make current health investments are more optimistic about their health than those who do not. For example, those with health insurance coverage have, on average, significantly higher expectations for longevity than those without. This average optimism extends to beliefs about future disability and, in part to beliefs about macroeconomic and policy events as well. Those with insurance are, on average, more optimistic about the likelihood of a depression or double-digit inflation. Only with respect to expectations for the generosity of Social Security are those with insurance less optimistic.

Those who regularly participate in vigorous physical activity and non-smokers also have higher expectations for longevity and lower expectations for disability, though this average optimism does not extend uniformly to beliefs about macroeconomic and Social Security policy events. Non-smokers, for example, are more optimistic about the prospects for a depression or for double-digit inflation, but those who get regular physical exercise are not. With respect to health screening decisions, men who were checked for prostate cancer and women who received a mammogram were more optimistic about their longevity and about macro events, though these average differences are often not statistically different from zero.

While the beliefs of those making different health decisions are different, so too are their other characteristics. For example, those lacking insurance coverage are more likely to be disadvantaged in other ways. Those without insurance coverage have less education, lower cognitive scores, lower income and wealth and, in many respects, worse health. As would be predicted by theory, those without health insurance also appear to be less averse to risk. Those participating in vigorous activity are somewhat wealthier, and considerably healthier than those who do not. Smokers are on average less educated, have lower cognitive scores, income and wealth, worse health, and are less averse to risk.

To account for these observable differences between those making different health decisions we regress the probability of making a current health investment on longevity beliefs and a variety of demographic, economic, and health controls. Column 1 of Table (2) presents the results for health insurance coverage in 1992. Conditional on current income, education, cognitive abilities, risk preferences, health, and a number of other characteristics, we estimate no association between beliefs about longevity and health insurance coverage status.

The point estimate is quite precisely estimated to be nearly zero.

Column 1 of Table (3) presents analogous results for the decision to participate in regular physical activity in 1992. In this case, there is a small positive association between beliefs for longevity and vigorous physical activity that is borderline statistically significant at the 10% level. The relationship between beliefs for longevity and health decisions is similarly weak for the case of prostate screenings (Table 5, Column 1) and for mammograms (Table 6, Column 1). Only in the case of smoking (Table 4, Column 1) is there a statistically significant association between beliefs about longevity and health decisions. A standard deviation increase in expectations for living to age 75 is associated with a decrease in a 3.1 point decrease in the probability smoking.

These estimates thus indicate little or no relationship between expectations for longevity and most current health decisions. Conditional on a number of relevant observables, those who make current health investments do not have systematically different beliefs from those who do not. Based on these estimates, there is little reason to think that those who forgo health investments are doing so because of their beliefs about this aspect of their future health.

5 Estimating General Optimism

While the estimates in Section 4 provide little or no evidence that variation in health investments is attributable to differences in beliefs, there are a number of reasons to think that these naive estimates do not accurately reflect the relationship between optimism about health and health decisions. First, even if the set of observable controls captured everything relevant to these health decisions, interpreting the estimates in Section 4 would be made difficult by the problem of reverse causality. Obtaining health insurance, not smoking, participating in physical activity, and getting health screenings should each have a direct influence on beliefs about future health. The challenge is to separate out this influence of behavior on beliefs from the statistical association between beliefs and behavior.

The second problem is the potential correlation of beliefs with unobserved variables that independently influence health decisions. For example, suppose individuals with family his-

tories of colon cancer tend to have greater human capital and be more averse to risk. With greater human capital and risk aversion they are more likely to obtain health insurance. Thus, if we cannot accurately control for their endowments and preferences, we will attribute too much of their *higher* probability of purchasing insurance to their relative pessimism about longevity. An alternative example suggests that the estimate would be biased in the other direction. Suppose individuals with family histories of prostate cancer tend to have lower human capital and less risk aversion. In the absence of adequate controls, we would then attribute too much of their *lower* probability of obtaining health insurance to their pessimistic beliefs about longevity. The HRS provides several measures of human capital, current health, parents' longevity, income risk aversion, and other potential determinants of health decisions, all of which are included in the estimates in Section 4. Nevertheless, there remains the concern that these measured differences do not fully capture the variation in factors that both are correlated with beliefs about future health and independently influence health decisions.

Our approach to dealing with the endogeneity problem and, less confidently, with the omitted variables problem, is to measure an individual's general tendency for optimism. Our goal is to capture a fixed, individual-specific index of optimism that may influence health decisions through its effect on beliefs about future health, but is uninfluenced by health decisions themselves. The construction of these optimism measures is motivated by theory and evidence in psychology that there is fundamental and systematic variation in individuals' prior beliefs about the likelihood of good events.[13] Some of this systematic variation in beliefs may be attributed to individual differences in mood or affect that have been found to be highly persistent over time: happy people are also optimistic people.[14] Individuals who are otherwise the same in ways that matter for health decisions may have different beliefs about the likelihood of future states of the world. Some will tend to be relatively pessimistic and

[13]This is a notion articulated by psychologists such as Seligman (1988, 2000), and Peterson, et al.(1988), and reflected in studies including Maruta, et al. (2000) and Danner, et al. (2001).

[14]This literature in psychology argues for the notion of an individual setpoint of mood determined by genetics and personality. Life events will cause individuals to briefly rise above or below this setpoint, but hedonic adaptation will quickly cause a return to the setpoint. See Jepson, et al. (2001) for an example of evidence of this phenomenon. For a critical review of the evidence for a setpoint of affect see Easterlin (2003).

others relatively optimistic. We use two techniques to measure an individual's tendency for optimism: (1) factor analysis on expectations regarding macroeconomic and Social Security policy events and (2) deviations from mean expectations for good weather.

The factor analysis technique follows Kezdi and Willis (2003), and isolates a common index from responses to the questions about macroeconomic and Social Security policy expectations described in section 3.[15] This factor analysis estimates a person-specific variable f_i with mean zero and variance 1 from the equation

$$a_{ij} = \lambda_j f_i + \omega_{ij}$$

where a_{ij} is individual i's (standardized) response to question j, λ_j is the factor loading for question j and ω_{ij} is the component of i's response that is specific to that question.[16] We implement the principal factor method to identify the f_i and λ_j that best fit the covariance matrix of the responses. The resulting estimates $\widehat{f_i}$ provide a measure of the extent to which individual i's expectations tend to differ from the average for all of the macroeconomic and policy probability questions. This method does not make assumptions on the importance of particular questions or on the correlation of responses between them. Nevertheless, the estimated factor happens to be significantly correlated with higher expectations for both good micro and good macro events (see Table A2 of the appendix). For this reason we, like Kezdi and Willis (2003), will refer to this factor as an "index of optimism."

Our second method of estimating a tendency for optimism follows Bassett and Lumsdaine (2001) by combining HRS warm up questions on expectations for sunshine with actual weather data and calculating deviations from average and from rational expectations. [Because HRS data on geographic location is available only on a restricted basis, these estimates are not yet available.]

Because the expectations used to construct these measures of optimism concern macroeconomic and policy or weather events, they should not be caused by individual health deci-

[15] Note that the index includes responses to expectations questions asked in Waves 1-5, though we will concentrate on behaviors as of Wave 1 and Wave 3.

[16] The standardized expecations responses have mean zero and standard deviation one. If a respondent did not answer one of the expectation questions, for the purposes of the factor analysis, that response is imputed to be zero. This imputation is done after the standardization.

sions.[17] Thus an IV strategy that predicts beliefs about longevity with either or both of these measures of optimism should eliminate the inconsistency attributable to reverse causality.

Whether this IV strategy will eliminate the inconsistency due to omitted variables is, however, less clear. A general tendency for optimism may be correlated with unobserved variables that, in turn affect health decisions. For example, it is plausible that those who have been the beneficiaries of unobserved good luck in the economic realm may be more optimistic about all domains.[18] If this were the case, the economically fortunate would be more likely to have favorable beliefs about economic growth, inflation or the weather, and our instruments would be correlated with determinants of health decisions. To the extent that this good luck in the economic realm represents a component of the error term in the equation describing the determinants of health decisions, the IV estimates will also be inconsistent. Relative to the OLS estimates in Section 4, the degree of inconsistency will depend on the correlation between the instrumented beliefs and the error term, and on the strength of the instruments.

6 Results

6.1 General Optimism and Health Decisions

Estimates of the relationship between the index of optimism and health decisions indicate that those with a general tendency for optimism are more likely to make current health investments. For example, Column 2 of Table (2) relates the Kezdi-Willis index of optimism to the decision to obtain health insurance coverage. Those who are, in general, more optimistic about the probabilities of good events are significantly more likely to be covered by health insurance. Similarly, those who do not smoke, men who get prostate screenings, and women who get mammograms are all, in general, significantly more optimistic in their expectations

[17] It is possible that, in the cases of exercise and smoking, that these activities are contributors to mood and thereby influence beliefs about events that are in no sense determined by the activities. This seems much less plausible in the case of insurance coverage or health screenings.

[18] Consistent with this story, Table (A2) of the appendix indicates that the Kedzi-Willis optimism index is positively correlated with education, income and wealth.

for good events. (See Column 2 of Tables (4)-(6).) Only the case of physical activity is an exception. Those who exercise are somewhat less optimistic in their general view, though this relationship is not statistically distinguishable from zero.

Taken together, these results indicate that individuals who make investments in their health are, in general, significantly more optimistic about the probabilities of good events. Our measure of general optimism is a significant and positive predictor of decisions to obtain health insurance, avoid smoking, and get cancer screenings.

6.2 IV Estimates for Optimistic Longevity Beliefs

The positive association between general optimism and current health decisions suggests that, generally, variation in beliefs may be an important determinant of certain health behaviors. In addition, because these measures of optimism are not subject to the problem of reverse causality, they have the potential to serve as useful, if imperfect instruments for beliefs about health. If these measures of optimism are sufficiently strong predictors of beliefs about future health, and if their correlation with unobserved determinants of health decisions is sufficiently small, then instrumenting health beliefs with optimism will provide more consistent estimates than would OLS.

The index of optimism is not, however a particularly strong predictor of beliefs about future health. Table (7) provides results from the first stage estimate of the relationship between beliefs about longevity and general optimism. Consistent with the idea that the measure captures a fundamental tendency for optimistic beliefs, there is a positive and statistically significant relationship between the optimism index and beliefs about the likelihood of living to age 75. A standard deviation increase in the index is associated with an increase of 0.056 standard deviations in longevity expectations in 1992. This relationship is comparable in size to a similar increase in a parent's age at death. The positive association between optimism and longevity beliefs does not, however, explain much more of the variation in those beliefs conditional on a number of observable variables. On the margin, the index of optimism contributes only 0.0028 to the R^2 of this first stage regression.

Despite the statistically significant relationship between optimism and beliefs, the instrument's lack of distinct explanatory power is a concern. To the extent that the instrument is

imperfect, and predicted beliefs remain correlated with the error term of the health decision equation, the inconsistency of the IV estimator relative to the OLS estimator is inflated by the inverse of the marginal R^2. Specifically, suppose the (demeaned) health decision equation is given by

$$y = \beta_1 x_1 + x_2 \beta_2 + \varepsilon$$

where y is the health decision, x_1 longevity beliefs and x_2 a set of other regressors. Suppose, moreover that the beliefs equation is given by

$$x_1 = \gamma_1 z + x_2 \gamma_2 + \upsilon \tag{3}$$

where z is the optimism instrument. In this case, the relative inconsistency of the IV estimator is given by:

$$\frac{\operatorname{p\lim} \widehat{\beta}_1^{IV} - \beta_1}{\operatorname{p\lim} \widehat{\beta}_1^{OLS} - \beta_1} = \frac{\sigma_{\hat{x}_1,\varepsilon}/\sigma_{x_1,\varepsilon}}{R^2_{x_1,z}}$$

where $\widehat{\beta}_1^{IV}$, $\widehat{\beta}_1^{OLS}$ are the IV and OLS estimators of β_1; $\hat{x}_1$ is the predicted value of beliefs x_1 using instruments z; $\sigma_{i,j}$ is the covariance between i and j; and $R^2_{x_1,z}$ is the marginal contribution the instrument z makes to the R^2 of the first stage equation 3.[19] Thus, the if the instruments are both weak and somewhat imperfect, in the sense that $\sigma_{\hat{x}_1,\varepsilon} \neq 0$, then OLS may be more consistent than IV.

With the knowledge that the optimism index is a weak instrument, we examine the second stage, IV estimates of the relationship between longevity beliefs and health decisions. As with general optimism, these estimates indicate that optimism about future health, in particular, is positively related to current health decisions. For example, Column 3 of Table 2 presents the IV estimate for insurance coverage. This estimate indicates that a standard deviation increase in beliefs about longevity is associated with a 25.4 percentage point increase in the probability of having insurance coverage. The IV estimates of the effect longevity beliefs on smoking, prostate checks and mammograms are similarly large, and positive. Standard deviation increases in beliefs about living to age 75 are estimated to decrease the probability of smoking by 88.9 percentage points (Table 4, column 3), increase the probability of getting a prostate check by 66.5 percentage points (Table 5, column 3), and increase the probability

[19] See Bound et al. (1995) for a derivation.

of getting a mammogram by 25.3 percentage points (Table 6, column 3). Only in the case of physical exercise is there no statistically significant, positive relationship between instrumented longevity beliefs and the decision to make a health investment. Indeed, in this case, the point estimate is of a negative relationship. (Table 4, column 3). Taken on their face, these estimates thus mostly indicate that increases in longevity beliefs have a large, positive impact on the likelihood of making a health investment. These estimates therefore suggest that the Mickey Mantle Effect is the more empirically relevant. Optimistic beliefs about future health generate, on average, more health investment.

7 Discussion

In seeking explanations for individual decisions about health, it is natural to think that expectations for future health may play an important role. Those who fail to get cancer screenings or avoid fatty foods or obtain low cost health insurance may do so because the hold very different beliefs about their future health than those who make healthier decisions. While common sense suggests that beliefs about future health should be an important determinant of current health decisions, this paper showed how the direction of the effect of differences in expectations for longevity is, in theory, unclear. Intuitively, differences in beliefs about future health may have two effects on health decisions. On the one hand, if a person thinks he is *likely* to enjoy long life and good health, regardless of his actions, the value of investments in health is limited. On the other hand, if a person believes he is *unlikely* to enjoy long life and good health, despite his best efforts, the value of investments in health and health insurance is also limited. Which influence of differences in beliefs is the most relevant for a typical decision maker is therefore an empirical question.

Analysis of expectations and health behavior data from the HRS indicates that beliefs about longevity are only weakly associated with current health decisions after conditioning a number of other demographic and economic characteristics. We find no statistically significant relationship between expectations for living to age 75 and decisions to obtain health insurance coverage, participate in vigorous physical activities, or get health screenings. Only smokers hold statistically more pessimistic beliefs about their likelihood for living to age 75.

The potential for problems of reverse causality and omitted variables implies that simple regressions of health decisions on health expectations do not reflect the true relationship between these behaviors and beliefs. We argue that an individual's index of general optimism, proxied by the tendency to answer questions about macroeconomic and policy events optimistically, is not subject to the reverse causality problem, and find a statistically significant, and sometimes relatively large, positive association between general optimism and most health investments. Those who have an underlying tendency for optimism are also significantly more likely to obtain health insurance, avoid smoking, and get cancer screenings. As an instrument for beliefs about future health, however, the index of optimism is weak. Thus IV estimates that instrument for longevity beliefs with optimism must be interpreted with caution. With this caution in mind, the IV estimates indicate that more optimistic beliefs about future health substantially increase the likelihood of obtaining health insurance and making most health investments. In the HRS, those who are more optimistic about their longevity are more likely to obtain health insurance, undertake preventive health measures and avoid smoking.

The theoretical basis and suggestive evidence for a positive association between optimism and health investment indicates that common health hazard information campaigns aimed at changing health behaviors ought to be complemented by less traditional strategies. The typical health hazard information campaign focuses on the gains in expected longevity that come from healthy choices. The theory and evidence provided in this paper suggest an alternative, complementary approach. Instead of emphasizing the changes in longevity associated with quitting smoking, or losing weight, or getting a colonoscopy, information campaigns might focus on the long life expectancies many now enjoy, and the connection between the health quality in old age and current choices about health. If current campaigns now say "live well now, so you can live long later," the alternative campaign would say "you're going to live long later, so you'd better live well now."

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Table 1: Comparison of Means By Health Decisions

	Insurance (Wave 1)		Vigorous Activity (Wave 1)		Smoking Status (Wave 1)		Check for Prostate Cancer (Wave 3)		Mammogram (Wave 3)	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Variable	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)	Mean (Std. Err.)
Expectations										
Live to 75	59.77 (0.85)	64.94 (0.34)	63.23 (0.35)	67.40 (0.69)	66.02 (0.35)	58.88 (0.64)	62.57 (0.94)	64.83 (0.63)	62.53 (0.97)	66.94 (0.55)
Live to 85	41.01 (0.89)	43.24 (0.37)	41.92 (0.38)	46.62 (0.77)	44.91 (0.39)	37.39 (0.66)	44.19 (1.00)	43.77 (0.70)	49.12 (1.02)	50.69 (0.60)
Health Limits Work	42.88 (1.05)	39.19 (0.37)	40.65 (0.39)	36.03 (0.80)	38.84 (0.40)	42.28 (0.72)	39.95 (1.07)	41.48 (0.75)	41.22 (1.24)	39.14 (0.75)
Depression	60.91 (0.75)	54.84 (0.30)	55.81 (0.31)	55.91 (0.65)	54.62 (0.32)	59.05 (0.56)	41.16 (0.90)	35.94 (0.61)	41.95 (0.90)	40.73 (0.53)
Inflation > 10%	62.71 (0.73)	58.64 (0.29)	59.25 (0.30)	59.54 (0.62)	58.20 (0.31)	62.25 (0.54)	51.42 (0.91)	46.36 (0.64)	52.94 (0.93)	51.96 (0.54)
Income Keeps up with Inflation							45.27 (1.05)	51.14 (0.76)	36.91 (1.00)	42.89 (0.63)
Home Price Rise	52.43 (0.87)	49.35 (0.34)	49.24 (0.35)	52.40 (0.72)	48.96 (0.37)	52.31 (0.63)				
Social Security Up	33.25 (0.81)	25.83 (0.30)	26.85 (0.31)	27.95 (0.65)	27.35 (0.33)	26.32 (0.55)				
Social Security Down	53.69 (0.85)	58.47 (0.35)	57.65 (0.36)	58.28 (0.73)	57.36 (0.37)	58.88 (0.64)	60.65 (0.94)	64.19 (0.65)	60.11 (0.92)	60.85 (0.54)
Optimism Measures										
Factor Analysis from All Waves	-0.14 (0.02)	0.03 (0.01)	-0.00 (0.01)	0.00 (0.02)	0.07 (0.01)	-0.18 (0.02)	-0.01 (0.03)	0.17 (0.02)	-0.17 (0.03)	-0.04 (0.02)
Sunny Residual from Wave 2										
Demography										
Years of Education	10.28 (0.09)	12.39 (0.03)	11.99 (0.36)	12.23 (0.08)	12.24 (0.04)	11.49 (0.06)	11.39 (0.10)	12.80 (0.06)	11.22 (0.09)	12.30 (0.05)
Female	0.56 (0.01)	0.52 (0.01)	0.53 (0.01)	0.52 (0.01)	0.54 (0.01)	0.49 (0.01)	0.00 (0.00)	0.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Black	0.21 (0.01)	0.17 (0.00)	0.18 (0.00)	0.17 (0.01)	0.17 (0.00)	0.19 (0.01)	0.16 (0.01)	0.13 (0.01)	0.17 (0.01)	0.19 (0.01)
Hispanic	0.21 (0.01)	0.07 (0.00)	0.09 (0.00)	0.11 (0.01)	0.10 (0.00)	0.08 (0.01)	0.12 (0.01)	0.06 (0.00)	0.12 (0.01)	0.08 (0.00)
Age	55.3 (0.08)	55.57 (0.04)	55.58 (0.04)	55.37 (0.07)	55.64 (0.04)	55.27 (0.06)	59.08 (0.09)	59.60 (0.06)	59.49 (0.09)	59.36 (0.06)
Total Income (Median)	16060 (1155)	40000 (563)	35000 (527)	38000 (1422)	39000 (635)	28000 (752)	35030 (1455)	50700 (2208)	22769 (1334)	36000 (1256)
Total Assets (Median)	32300 (10859)	103000 (5318)	87500 (4901)	106600 (13142)	107000 (6015)	56700 (6286)	80750 (11164)	157500 (15207)	55500 (15115)	127000 (9885)
Words recalled, short delay (standarized)	5.01 (0.08)	6.27 (0.03)	6.04 (0.04)	6.14 (0.07)	6.28 (0.04)	5.49 (0.06)	5.54 (0.09)	6.44 (0.06)	5.77 (0.09)	6.35 (0.05)
Cognition: WAIS relationships	6.79 (0.07)	7.54 (0.03)	7.38 (0.03)	7.50 (0.06)	7.49 (0.03)	7.18 (0.05)	6.68 (0.07)	7.27 (0.05)	7.58 (0.08)	7.93 (0.05)
Words recalled, longer delay	3.14 (0.03)	3.32 (0.01)	3.30 (0.01)	3.24 (0.03)	3.31 (0.01)	3.23 (0.02)	3.19 (0.03)	3.29 (0.02)	3.32 (0.03)	3.32 (0.02)
Health Status										
# of adls with some difficulty	0.11 (0.01)	0.09 (0.00)	0.10 (0.01)	0.03 (0.00)	0.08 (0.01)	0.11 (0.01)	0.20 (0.02)	0.18 (0.01)	0.32 (0.02)	0.22 (0.01)
cesd score	1.15 (0.05)	0.73 (0.02)	0.84 (0.02)	0.65 (0.03)	0.71 (0.02)	1.04 (0.03)	1.26 (0.05)	0.92 (0.03)	1.65 (0.06)	1.36 (0.04)
sum of conditions ever had	1.13 (0.03)	1.13 (0.01)	1.18 (0.01)	0.94 (0.02)	1.11 (0.01)	1.19 (0.02)	1.08 (0.03)	1.47 (0.02)	1.54 (0.04)	1.57 (0.02)
body mass index=kg/m	27.39 (0.14)	27.14 (0.06)	27.38 (0.06)	26.34 (0.11)	27.60 (0.06)	26.06 (0.10)	27.20 (0.12)	27.62 (0.08)	27.55 (0.17)	27.32 (0.10)
marital status	0.70 (0.01)	0.78 (0.00)	0.76 (0.00)	0.76 (0.01)	0.79 (0.00)	0.68 (0.01)	0.79 (0.01)	0.86 (0.01)	0.58 (0.01)	0.69 (0.01)
self-report of health	0.69 (0.01)	0.79 (0.00)	0.76 (0.00)	0.84 (0.01)	0.80 (0.00)	0.71 (0.01)	0.76 (0.01)	0.79 (0.01)	0.71 (0.01)	0.78 (0.01)
self-report of health change	0.83 (0.01)	0.88 (0.00)	0.86 (0.00)	0.91 (0.01)	0.88 (0.00)	0.85 (0.01)	0.81 (0.01)	0.81 (0.01)	0.79 (0.01)	0.80 (0.01)

# of iadls with some difficulty	0.37 (0.02)	0.22 (0.01)	0.26 (0.01)	0.19 (0.01)	0.23 (0.01)	0.27 (0.01)	0.09 (0.01)	0.06 (0.01)	0.10 (0.01)	0.06 (0.01)
hlth problems limit work	0.27 (0.01)	0.20 (0.00)	0.24 (0.00)	0.13 (0.01)	0.20 (0.00)	0.27 (0.01)	0.25 (0.01)	0.26 (0.01)	0.33 (0.01)	0.27 (0.01)
mother alive	0.41 (0.012)	0.43 (0.006)	0.43 (0.006)	0.43 (0.011)	0.43 (0.006)	0.42 (0.010)	0.32 (0.013)	0.32 (0.010)	0.30 (0.013)	0.32 (0.008)
mother's age (at death)	72.25 (0.35)	73.23 (0.14)	73.09 (0.15)	72.98 (0.29)	73.39 (0.15)	72.24 (0.26)	74.09 (0.40)	75.15 (0.27)	73.56 (0.40)	74.57 (0.25)
father alive	0.17 (0.010)	0.17 (0.004)	0.17 (0.004)	0.17 (0.009)	0.17 (0.005)	0.15 (0.007)	0.11 (0.008)	0.11 (0.006)	0.08 (0.008)	0.11 (0.005)
father's age (at death)	69.30 (0.37)	70.26 (0.15)	70.07 (0.16)	70.22 (0.32)	70.42 (0.16)	69.24 (0.27)	70.63 (0.39)	71.31 (0.28)	69.62 (0.42)	70.38 (0.26)
N	1585	7985	7844	1917	7080	2681	1368	2441	1303	3209

The health limits work question was answered by only 832 and 5500 respondents without insurance and with insurance, respectively.
See Table A1 of the appendix for variable definitions.

Table 2: Insurance Coverage Status, Subjective Beliefs about Longevity and General Optimism

Dependent Variable: Having Insurance Coverage in 1992					
	Naïve OLS Regression	Reduced Form Regression With f	IV Regression with f	Reduced Form Regression With Sunshine	IV Regression with Sunshine
Covariates	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)
Subj. Prob. Live to 75 (standardized)	0.0022 (0.0045)		0.2542 (0.0957)**		
Optimism Index		0.0143 (0.0046)**			
Demography					
Years of Education (Standardized)	0.0533 (0.0061)**	0.053 (0.0060)**	0.0368 (0.0096)**		
Female	-0.0126 (0.0081)	-0.01 (0.0081)	-0.0538 (0.0182)**		
Black	-0.0165 (0.0124)	-0.0158 (0.0124)	-0.0744 (0.0262)**		
Hispanic	-0.1364 (0.0193)**	-0.1384 (0.0193)**	-0.1142 (0.0240)**		
Age (Standardized)	0.0173 (0.0042)**	0.0167 (0.0042)**	0.0099 (0.0058)		
Total Income (Standardized)	0.0445 (0.0066)**	0.0434 (0.0065)**	0.0413 (0.0071)**		
Total Assets (Standardized)	-0.025 (0.0048)**	-0.0254 (0.0048)**	-0.0279 (0.0055)**		
Health, Risk Attitudes and Cognition					
# of adls with some difficulty (standardized)	0.0109 (0.0050)*	0.0108 (0.0050)*	0.0066 (0.0070)		
cesd score (Standardized)	-0.0189 (0.0058)**	-0.0183 (0.0058)**	0.0068 (0.0119)		
sum of conditions ever had (Standardized)	0.0212 (0.0048)**	0.0215 (0.0048)**	0.0416 (0.0099)**		
body mass index=kg/m (Standardized)	0.001 (0.0043)	0.001 (0.0043)	0.002 (0.0051)		
married	0.0311 (0.0108)**	0.0309 (0.0108)**	0.0363 (0.0128)**		
self-report of health	0.01 (0.0144)	0.01 (0.0143)	-0.0989 (0.0453)*		
self-report of health change	0.0229 (0.0146)	0.0218 (0.0145)	-0.0109 (0.0217)		
# of iadls with some difficulty (standardized)	-0.0034 (0.0056)	-0.0035 (0.0056)	0.0028 (0.0068)		
hlth problems limit work	-0.0043 (0.0132)	-0.0024 (0.0132)	0.0111 (0.0167)		
mother alive	0.0068 (0.0091)	0.0076 (0.0091)	-0.0199 (0.0148)		
mother's age, at death (standardized)	-0.0057 (0.0047)	-0.0058 (0.0047)	-0.017 (0.0071)*		
father's age, at death (standardized)	0.0055 (0.0044)	0.0056 (0.0044)	-0.0108 (0.0082)		
father alive	-0.0084 (0.0114)	-0.0082 (0.0114)	-0.0273 (0.0154)		
Income risk attitude (standardized)	0.0182 (0.0042)**	0.0181 (0.0042)**	0.0198 (0.0050)**		
Words recalled, short delay (standarized)	0.0051 (0.0059)	0.0048 (0.0059)	0.0093 (0.0073)		
Cognition: WAIS relationships (standarized)	0.0097 (0.0049)*	0.0093 (0.0049)	0.0103 (0.0059)		
Words recalled, longer delay (standarized)	-0.0033 (0.0059)	-0.0032 (0.0058)	-0.0073 (0.0072)		
Constant	0.8126 (0.0207)**	0.8115 (0.0204)**	0.9734 (0.0657)**		
Observations	7946	7946	7946		
R-squared	0.09	0.09	**		

Robust standard errors in parentheses

* significant at 5%; ** significant at 1%

See Table A1 of the appendix for variable definitions.

Table 3: Vigorous Physical Activity Status, Subjective Beliefs about Longevity and General Optimism

	Dependent Variable: Participating in Vigorous Physical Activity in 1992				
	Naïve OLS Regression	Reduced Form Regression With f	IV Regression with f	Reduced Form Regression With Sunshine	IV Regression with Sunshine
Covariates	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)
Subj. Prob. Live to 75 (standardized)	0.0082 (0.0049)		-0.1455 (0.1010)		
Optimism Index		-0.0079 (0.0052)			
Demography, Income and Wealth					
Years of Education (Standardized)	-0.0053 (0.0064)	-0.0045 (0.0064)	0.0049 (0.0095)		
Female	-0.0117 (0.0095)	-0.0115 (0.0095)	0.0136 -0.0194		
Black	0.0215 (0.0133)	0.0233 (0.0133)	0.0559 (0.0265)*		
Hispanic	0.0541 (0.0185)**	0.0543 (0.0185)**	0.0397 (0.0217)		
Age (Standardized)	-0.0085 (0.0048)	-0.0079 (0.0048)	-0.004 (0.0059)		
Total Income (Standardized)	0.0107 (0.0064)	0.0114 (0.0064)	0.0125 (0.0068)		
Total Assets (Standardized)	0.0107 (0.0059)	0.011 (0.0059)	0.0125 (0.0061)*		
Health, Risk Attitudes and Cognition					
# of adls with some difficulty (standardized)	-0.0099 (0.0035)**	-0.0097 (0.0035)**	-0.0072 (0.0047)		
cesd score (Standardized)	-0.0032 (0.0050)	-0.0045 (0.0050)	-0.0187 (0.0115)		
sum of conditions ever had (Standardized)	-0.0063 (0.0052)	-0.0072 (0.0052)	-0.0188 (0.0099)		
body mass index=kg/m (Standardized)	-0.0273 (0.0044)**	-0.0274 (0.0044)**	-0.0279 (0.0047)**		
married	-0.0183 (0.0112)	-0.0185 (0.0112)	-0.0222 (0.0122)		
self-report of health	0.0083 (0.0144)	0.0124 (0.0143)	0.0758 (0.0467)		
self-report of health change	0.0258 (0.0140)	0.0276 (0.0140)*	0.0457 (0.0199)*		
# of iadls with some difficulty (standardized)	-0.0085 (0.0051)	-0.0087 (0.0051)	-0.0124 (0.0060)*		
hlth problems limit work	-0.0489 (0.0130)**	-0.0505 (0.0130)**	-0.0577 (0.0153)**		
mother alive	-0.0054 (0.0103)	-0.0048 (0.0103)	0.0108 (0.0154)		
mother's age, at death (standardized)	-0.0062 (0.0051)	-0.0057 (0.0051)	0.0012 (0.0073)		
father's age, at death (standardized)	0.0019 (0.0049)	0.0025 (0.0049)	0.0119 (0.0084)		
father alive	-0.0209 (0.0131)	-0.0203 (0.0131)	-0.009 (0.0160)		
Income risk attitude (standardized)	-0.0086 (0.0046)	-0.0086 (0.0046)	-0.0097 (0.0049)*		
Words recalled, short delay (standarized)	-0.0018 (0.0071)	-0.0018 (0.0071)	-0.0043 (0.0078)		
Cognition: WAIS relationships (standarized)	-0.0008 (0.0056)	-0.0006 (0.0056)	-0.0014 (0.0059)		
Words recalled, longer delay (standarized)	-0.0023 (0.0068)	-0.0021 (0.0068)	0.0003 (0.0074)		
Constant	0.195 (0.0209)**	0.1896 (0.0206)**	0.0974 -0.0675		
Observations	8079	8079	8079		
R-squared	0.02	0.02			

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%
See Table A1 of the appendix for variable definitions.

Table 4: Smoking Status, Subjective Beliefs about Longevity and General Optimism

	Dependent Variable: Self-described smoker in 1992				
	Naïve OLS Regression	Reduced Form Regression With f	IV Regression with f	Reduced Form Regression With Sunshine	IV Regression with Sunshine
Covariates	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)
Subj. Prob. Live to 75 (standardized)	-0.0305 (0.0055)**		-0.8893 (0.2120)**		
Optimism Index		-0.0485 (0.0055)**			
Demography, Income and Wealth					
Years of Education (Standardized)	-0.0315 (0.0067)**	-0.0318 (0.0066)**	0.0255 (0.0203)		
Female	-0.0581 (0.0100)**	-0.0706 (0.0100)**	0.083 (0.0406)*		
Black	-0.018 (0.0148)	-0.0251 (0.0147)	0.1741 (0.0568)**		
Hispanic	-0.1273 (0.0190)**	-0.1185 (0.0189)**	-0.2081 (0.0480)**		
Age (Standardized)	-0.0349 (0.0051)**	-0.0333 (0.0051)**	-0.0098 (0.0123)		
Total Income (Standardized)	-0.0209 (0.0058)**	-0.0175 (0.0058)**	-0.011 (0.0111)		
Total Assets (Standardized)	-0.0182 (0.0044)**	-0.0172 (0.0044)**	-0.0082 (0.0101)		
Health, Risk Attitudes and Cognition					
# of adls with some difficulty (standardized)	-0.0107 -0.0062	-0.0105 -0.0063	0.0047 (0.0157)		
cesd score (Standardized)	0.0256 (0.0062)**	0.0259 (0.0061)**	-0.0612 (0.0255)*		
sum of conditions ever had (Standardized)	-0.0033 (0.0060)	-0.0025 (0.0060)	-0.0734 (0.0218)**		
body mass index=kg/m (Standardized)	-0.0708 (0.0058)**	-0.0706 (0.0057)**	-0.0738 (0.0107)**		
married	-0.0972 (0.0126)**	-0.096 (0.0125)**	-0.1187 (0.0262)**		
self-report of health	-0.0429 (0.0165)**	-0.0529 (0.0163)**	0.3341 (0.1005)**		
self-report of health change	0.0032 (0.0171)	0.0039 (0.0170)	0.1146 (0.0467)*		
# of iadls with some difficulty (standardized)	-0.0047 (0.0060)	-0.0036 (0.0060)	-0.0264 (0.0137)		
hlth problems limit work	0.0233 (0.0153)	0.018 (0.0152)	-0.0259 (0.0347)		
mother alive	0.001 (0.0111)	-0.0041 (0.0111)	0.0909 (0.0319)**		
mother's age, at death (standardized)	-0.0051 (0.0055)	-0.0059 (0.0055)	0.0364 (0.0157)*		
father's age, at death (standardized)	-0.0043 (0.0053)	-0.0063 (0.0053)	0.0512 (0.0176)**		
father alive	-0.0193 (0.0140)	-0.0219 (0.0139)	0.0475 (0.0326)		
Income risk attitude (standardized)	-0.01 (0.0049)*	-0.0094 (0.0049)	-0.0165 (0.0105)		
Words recalled, short delay (standarized)	-0.0023 (0.0074)	-0.001 (0.0074)	-0.0166 (0.0162)		
Cognition: WAIS relationships (standarized)	-0.0355 (0.0059)**	-0.034 (0.0059)**	-0.0388 (0.0123)**		
Words recalled, longer delay (standarized)	0.0129 (0.0072)	0.0124 (0.0072)	0.0272 (0.0153)		
Constant	0.4121 (0.0243)**	0.4302 (0.0239)**	-0.1337 (0.1447)		
Observations	8079	8079	8079		
R-squared	0.09	0.09			

Robust standard errors in parentheses

* significant at 5%; ** significant at 1%

See Table A1 of the appendix for variable definitions.

Table 5: Prostate Screening, Subjective Beliefs about Longevity, and General Optimism, Men in the HRS

	Dependent Variable: Received a Prostate Screening in two years prior to 1996				
	Naïve OLS Regression	Reduced Form Regression With f	IV Regression with f	Reduced Form Regression With Sunshine	IV Regression with Sunshine
Covariates	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)
Subj. Prob. Live to 75 (standardized)	0.0136 (0.0099)		0.665 (0.2758)*		
Optimism Index		0.0343 (0.0086)**			
Demography, Income and Wealth					
Years of Education (Standardized)	0.066 (0.0110)**	0.0639 (0.0110)**	0.0508 (0.0191)**		
Black	-0.0018 (0.0278)	0.0013 (0.0278)	-0.0986 (0.0594)		
Hispanic	-0.0091 (0.0345)	-0.0144 (0.0349)	-0.0425 (0.0575)		
Age (Standardized)	0.0293 (0.0089)**	0.0297 (0.0088)**	-0.017 (0.0241)		
Total Income (Standardized)	0.0258 (0.0097)**	0.0255 (0.0095)**	0.0031 (0.0134)		
Total Assets (Standardized)	0.0055 (0.0066)	0.0035 (0.0066)	0.0044 (0.0117)		
Health, Risk Attitudes and Cognition					
# of adls with some difficulty (standardized)	0.0057 -0.0119	0.0067 -0.0119	0.0054 (0.0209)		
cesd score (Standardized)	-0.0278 (0.0121)*	-0.0269 (0.0121)*	0.0327 (0.0322)		
sum of conditions ever had (Standardized)	0.111 (0.0107)**	0.111 (0.0106)**	0.1858 (0.0366)**		
body mass index=kg/m (Standardized)	0.0132 (0.0107)	0.0131 (0.0106)	0.0343 (0.0196)		
married	0.0949 (0.0241)**	0.0939 (0.0241)**	0.0708 (0.0399)		
self-report of health	0.0608 (0.0280)*	0.0633 (0.0277)*	-0.1869 (0.1144)		
self-report of health change	-0.0084 (0.0256)	-0.0081 (0.0253)	-0.1307 (0.0678)		
# of iadls with some difficulty (standardized)	-0.0161 (0.0117)	-0.0172 (0.0118)	0.0025 (0.0236)		
hlth problems limit work	0.0156 (0.0242)	0.0214 (0.0240)	0.0821 (0.0497)		
mother alive	-0.0149 (0.0201)	-0.0119 (0.0201)	-0.0443 (0.0339)		
mother's age, at death (standardized)	0.0024 (0.0096)	0.0029 (0.0096)	-0.0279 (0.0206)		
father's age, at death (standardized)	0.0064 (0.0095)	0.0063 (0.0095)	-0.0349 (0.0238)		
father alive	0.011 (0.0289)	0.0144 (0.0289)	-0.0861 (0.0592)		
Income risk attitude (standardized)	0.0156 (0.0083)	0.0158 (0.0083)	0.01 (0.0139)		
Words recalled, short delay (standarized)	0.03 (0.0133)*	0.0284 (0.0133)*	0.0149 (0.0223)		
Cognition: WAIS relationships (standarized)	0.0239 (0.0103)*	0.0216 (0.0102)*	0.0208 (0.0167)		
Words recalled, longer delay (standarized)	-0.0245 (0.0130)	-0.024 (0.0130)	-0.0231 (0.0209)		
Constant	0.5279 (0.0380)**	0.5197 (0.0374)**	0.9016 (0.1681)**		
Observations	2937	2937	2937		
R-squared	0.10	0.11			

Robust standard errors in parentheses

* significant at 5%; ** significant at 1%

See Table A1 of the appendix for variable definitions.

Table 6: Mammogram, Subjective Beliefs about Longevity, and General Optimism, Women in the HRS

	Dependent Variable: Had a Mammogram in two years prior to 1996				
	Naïve OLS Regression	Reduced Form Regression With f	IV Regression with f	Reduced Form Regression With Sunshine	IV Regression with Sunshine
Covariates	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)	Coefficient (Std. Err.)
Subj. Prob. Live to 75 (standardized)	0.0123 (0.0083)		0.2533 (0.1181)*		
Optimism Index		0.0196 (0.0081)*			
Demography, Income and Wealth					
Years of Education (Standardized)	0.0676 (0.0109)**	0.0686 (0.0108)**	0.0462 (0.0161)**		
Black	0.0784 (0.0219)**	0.08 (0.0218)**	0.0332 (0.0330)		
Hispanic	0.0287 (0.0301)	0.0274 (0.0300)	0.0235 (0.0337)		
Age (Standardized)	0.0003 (0.0078)	-0.0008 (0.0078)	-0.0024 (0.0087)		
Total Income (Standardized)	0.0225 (0.0087)**	0.0215 (0.0087)*	0.0191 (0.0088)*		
Total Assets (Standardized)	0.028 (0.0080)**	0.0266 (0.0080)**	0.0251 (0.0089)**		
Health, Risk Attitudes and Cognition					
# of adls with some difficulty (standardized)	-0.0032 -0.0095	-0.0039 -0.0095	0.0031 (0.0113)		
cesd score (Standardized)	0.0013 (0.0082)	0.0013 (0.0082)	0.0217 (0.0134)		
sum of conditions ever had (Standardized)	0.036 (0.0091)**	0.0355 (0.0091)**	0.0671 (0.0181)**		
body mass index=kg/m (Standardized)	-0.0088 (0.0071)	-0.0085 (0.0071)	-0.0126 (0.0080)		
married	0.0871 (0.0171)**	0.0858 (0.0172)**	0.0908 (0.0189)**		
self-report of health	0.0373 (0.0244)	0.041 (0.0243)	-0.0444 (0.0493)		
self-report of health change	-0.0268 (0.0217)	-0.0264 (0.0217)	-0.0492 (0.0267)		
# of iadls with some difficulty (standardized)	0.0068 (0.0107)	0.0066 (0.0106)	0.0158 (0.0132)		
hlth problems limit work	-0.0271 (0.0204)	-0.0256 (0.0203)	-0.0068 (0.0245)		
mother alive	-0.0094 (0.0173)	-0.008 (0.0173)	-0.024 (0.0206)		
mother's age, at death (standardized)	0.0054 (0.0082)	0.0059 (0.0081)	-0.0115 (0.0120)		
father's age, at death (standardized)	0.0079 (0.0079)	0.0089 (0.0079)	-0.0028 (0.0102)		
father alive	0.0224 (0.0245)	0.0227 (0.0244)	0.0275 (0.0282)		
Income risk attitude (standardized)	-0.0005 (0.0075)	-0.0008 (0.0075)	0.003 (0.0085)		
Words recalled, short delay (standarized)	-0.0038 (0.0109)	-0.0036 (0.0108)	-0.0039 (0.0121)		
Cognition: WAIS relationships (standarized)	0.0026 (0.0091)	0.0026 (0.0091)	-0.0014 (0.0102)		
Words recalled, longer delay (standarized)	0.0025 (0.0102)	0.0024 (0.0102)	0.0014 (0.0113)		
Constant	0.6428 (0.0292)**	0.6414 (0.0292)**	0.7167 (0.0483)**		
Observations	3816	3816	3816		
R-squared	0.05	0.05			

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%
See Table A1 of the appendix for variable definitions.

Table 7: Estimates of Longevity Beliefs as a Function of General Optimism

	Dependent Variable	
	Expectation for Living to age 75 in 1992 (standardized)	Expectation for Living to age 75 in 1996 (standardized)
Covariates	Coefficient (Std. Err.)	Coefficient (Std. Err.)
Optimism Index	0.0561 (0.0119)**	0.0637 (0.0121)**
Demography, Income and Wealth		
Years of Education (Standardized)	0.0644 (0.0148)**	0.0537 (0.0151)**
Female	0.1728 (0.0213)**	0.1322 (0.0226)**
Black	0.224 (0.0327)**	0.18 (0.0357)**
Hispanic	-0.1007 (0.0451)*	0.0226 (0.0452)
Age (Standardized)	0.0264 (0.0108)*	0.0355 (0.0114)**
Total Income (Standardized)	0.0074 (0.0108)	0.0228 (0.0109)*
Total Assets (Standardized)	0.01 (0.0103)	0.0029 (0.0114)
Health, Risk Attitudes and Cognition		
# of adls with some difficulty (standardized)	0.017 -0.0163	-0.0166 -0.0174
cesd score (Standardized)	-0.098 (0.0141)**	-0.0846 (0.0144)**
sum of conditions ever had (Standardized)	-0.0797 (0.0133)**	-0.12 (0.0141)**
body mass index=kg/m (Standardized)	-0.0036 (0.0111)	0.0014 (0.0121)
married	-0.0255 (0.0260)	-0.0036 (0.0268)
self-report of health	0.4352 (0.0372)**	0.3539 (0.0399)**
self-report of health change	0.1245 (0.0382)**	0.1247 (0.0360)**
# of iadls with some difficulty (standardized)	-0.0256 (0.0133)	-0.0339 (0.0190)
hlth problems limit work	-0.0494 (0.0340)	-0.0831 (0.0331)*
mother alive	0.1069 (0.0234)**	0.0581 (0.0252)*
mother's age, at death (standardized)	0.0475 (0.0122)**	0.0598 (0.0125)**
father's age, at death (standardized)	0.0647 (0.0111)**	0.0531 (0.0119)**
father alive	0.078 (0.0283)**	0.0595 (0.0353)
Income risk attitude (standardized)	-0.0079 (0.0106)	-0.0037 (0.0113)
Words recalled, short delay (standarized)	-0.0175 (0.0160)	0.0065 (0.0165)
Cognition: WAIS relationships (standarized)	-0.0053 (0.0124)	0.0083 (0.0131)
Words recalled, longer delay (standarized)	0.0166 (0.0152)	0.0039 (0.0156)
Constant	-0.6341 (0.0520)**	-0.4842 (0.0505)**
Observations	8079	6757
R-squared	0.15	0.17
Marginal R-squared	0.0028	0.0039

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%
See Table A1 of the appendix for variable definitions.

Table A1: Variable Descriptions

Description	Source	Values	Comments	Includes Imputed Values
Outcome Variables				
Covered by insurance in Wave 1	RAND and HRS	Dummy	Indicates whether respondent is covered by any government or private health insurance, including coverage from his or her spouse.	No
Participates in vigorous activity	RAND	Dummy	Indicates whether the respondent partipates in vigorous physical activity at least 3 times per week. Includes housework and other physical labor.	No
Now a smoker	RAND	Dummy	Indicates whether the respondent self-identifies as a smoker.	Yes
Had mammogram	RAND	Dummy	Indicates whether the respondent had a mammogram in the two years prior to interview in 1996 (females only)	No
Had prostate screen	RAND	Dummy	Indicates whether the respondent had a prostate cancer screen in the two years prior to interview in 1996 (males only)	No
Demographic and Economic Controls				
Years of education	RAND	0-17	Self-reported years of completed schooling	Yes
Female	RAND	Dummy		Yes
Black	RAND	Dummy	Self-identified race	No
Hispanic	RAND	Dummy	Self-identified ethnicity	No
Age at end of interview	RAND	Numeric		No
total household income	RAND	Numeric		Yes
total household assets	RAND	Numeric	The net value of total wealth is calculated as the sum of all wealth components less all debt.	Yes
# of adls with some difficulty	RAND	0-5	The number of adls that the respondent has at least some difficulty performing	Yes
Mental health (cesd) score	RAND	0-8	Center for Epidemiologic Studies Depression Scale. See Radloff LS, "The CES-D scale: A self-report depression scale for research in the general population." Applied Psychological Measurement, 1, 1977, pp.385-401	Yes
sum of doctor diagnosed conditions ever had	RAND	0-7	Sums diagnoses of (1) high blood pressure or hypertension; 2) diabetes or high blood sugar; 3) cancer or a malignant tumor of any kind except skin cancer; 4) chronic lung disease except asthma such as chronic bronchitis or emphysema; 5) heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; 6) stroke; 7) emotional, nervous, or psychiatric problems; and 8) arthritis or rheumatism.	Yes
body mass index=kg/m	RAND	Numeric	(weight / height^2).	Yes
married	RAND	Dummy		No
self-report of health (Modified)	RAND	Dummy	Respondent's self reported health at least "good."	Imputed HRS W1
self-report of health change (Modified)	RAND	Dummy	Respondent's self reported health at least as "good" as two years ago.	Imputed HRS W1
# of iadls with some difficulty	RAND	0-3	Number of IADLs respondent has at least some difficulty performing. IADLs include reading a map, using a calculator, and using a microwave.	Imputed HRS W1
hlth problems limit work	RAND	Dummy	Indicates whether an impairment or health problem limits the kind or amount of paid work for the respondent.	No
mother alive	RAND	Dummy	Indicates whether respondent's mother is currently living	No

father alive	RAND	Dummy	Indicates whether respondent's father is currently living	No
mother age current/at death	RAND	Numeric	Mother’s current age if living or age at death if deceased.	No
father age current/at death	RAND	Numeric	Father’s current age if living or age at death if deceased.	No
Income risk attitude	RAND	1-4	Hypothetical choice between two jobs, one with guaranteed income, another with known probability of increasing and decreasing income. Responses fall into four possible categorie. Those who accept a job with even chances of doubling income and cutting income in half are least risk averse. Those who accept a job with with even chances of doubling or cutting by a third are more risk averse. Those who would take a job with even chances of doubling income or cutting by 20% are still more risk averse. Those who refuse all of the above are most risk averse.	Yes
Words recalled after short delay	HRS	0-20	Number of words, from a list of 20 read out loud, that the respondent can recall just after the list was read.	No
WAIS relationships score	HRS	0-14	Score measuring the respondents ability to describe the relationship between pairs of objects. The questions asks "In what way are X and Y alike" where examples of X and Y are orange and bananna.	No
Words recalled after longer delay	HRS	0-20	Number of words, from a list of 20 read out loud, that the respondent can recall several minutes after thew list was read	No

Table A2 Correlation Coefficients for Optimism Index, Demographic Variables, and Expectations in 1992

Variables	demographics						
	optimism	education	income	wealth	age	female	black
Optimism index	1.000						
Years of education	0.100 (0.000)	1.000					
Hhld. Income (1992)	0.145 (0.000)	0.345 (0.000)	1.000				
Hhld. Wealth (1992)	0.105 (0.000)	0.223 (0.000)	0.515 (0.000)	1.000			
Age	0.041 (0.000)	-0.069 (0.000)	-0.073 (0.000)	0.042 (0.000)	1.000		
Female	-0.092 (0.000)	-0.041 (0.000)	-0.109 (0.000)	-0.032 (0.002)	-0.007 (0.501)	1.000	
Black	-0.044 (0.000)	-0.113 (0.000)	-0.145 (0.000)	-0.147 (0.000)	0.004 (0.705)	0.047 (0.000)	1.000
Married (1992)	0.070 (0.000)	0.054 (0.000)	0.262 (0.000)	0.146 (0.000)	-0.022 (0.032)	-0.178 (0.000)	-0.212 (0.000)

Variables	expectations						
	optimism	live to 75 ('92)	live to 85 ('92)	limit work ('92)	inflation ('92)	home up ('92)	SS up ('92)
Optimism index	1.000						
Live to age 75 (1992)	0.100 (0.000)	1.000					
Live to age 85 (1992)	0.079 (0.000)	0.751 (0.000)	1.000				
Health will limit work (1992)	-0.134 (0.000)	-0.231 (0.000)	-0.198 (0.000)	1.000			
Inflation > 10% (1992)	-0.542 (0.000)	-0.039 (0.000)	-0.038 (0.000)	0.063 (0.000)	1.000		
Depression (1992)	-0.545 (0.000)	-0.046 (0.000)	-0.036 (0.001)	0.086 (0.000)	0.530 (0.000)	1.000	
Home prices up (1992)	-0.121 (0.000)	0.062 (0.000)	0.098 (0.000)	0.028 (0.028)	0.140 (0.000)	0.141 (0.000)	1.000
Soc. Security up (1992)	0.086 (0.000)	0.065 (0.000)	0.113 (0.000)	0.054 (0.000)	-0.023 (0.031)	-0.015 (0.159)	0.205 (0.000)

P-values in parentheses