Individual Perceptions of Mortality Decline

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Abstract

Demographers are well aware of the vast decreases in mortality among industrialized countries during the past century, and they generally expect mortality decline to continue into the future. But how do individuals perceive the chances for their future survival? Survivorship expectations should influence a wide array of economic decisions and thus well-being, from the amount of education to obtain to the amount of money to save for retirement. Previous research exploring survivorship expectations in panel data has shown that they are correlated with current health status, behaviors, and with future mortality, and that they approximate life table quantities. In this paper, I take a closer look at the accuracy of survivorship expectations along two main dimensions. I examine systematic biases in self-reported survivorship expectations by racial group, and I assess the updating of survivorship expectations over time within a cohort and between cohorts. I find an interesting mix of irrational optimism and pessimism among groups identified by race, sex, and age, but I also find evidence that over time, individuals appear to understand that mortality decline is occurring.

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1 Background and motivation

Industrialized countries have witnessed remarkable declines in human mortality during the course of modern development, and future declines are envisaged. Average life spans have roughly doubled since the 19th Century (Oeppen and Vaupel, 2002), and the variability in life spans has fallen dramatically (Wilmoth and Horiuchi, 1999). Although there is debate about the exact scope for future improvements in mortality (Olshansky et al., 2005; Tuljapurkar, 2005), the prevailing view among demographers and practitioners alike is that mortality rates will continue to fall and average life spans will continue to lengthen. The Social Security Chief Actuary predicts that period life expectancy at birth is likely to rise about 5 years for both males and females by 2080 (Board of Trustees, 2005), which is a conservative estimate relative to the historical pattern of gains (Lee and Carter, 1992; Tuljapurkar, Li and Boe, 2000; Oeppen and Vaupel, 2002; White, 2002).

Historical gains have greatly impacted human well-being, and future gains bear implications for public pension systems (Lee, 2000) and fiscal planning in general (Auerbach and Hassett, 2001), as well as for individual choice. The basic life cycle model of Modigliani and Brumberg (1954) recognizes that the length of life is a key parameter for an array of economic decisions, such as the amount to save versus consume, the amount of education to obtain (Kalemli-Ozcan, 2002), and when to retire (Kalemli-Ozcan and Weil, 2002). A key question for research, then, is how aware individuals are about their future survivorships.

As researchers, we know that individual life spans are highly uncertain due to idiosyncratic risks based on genetics, environment, and behavior, and it appears that people know this also. Previous research has shown that self-reported survivorship probabilities appear to reflect these individual risks (Hurd and McGarry, 1995, 2002). How accurate these perceptions are is a matter of some debate. Schoenbaum (1997) reports that heavy smokers have unrealistically high survivorship expectations, while nonsmokers and light smokers have more accurate perceptions. Examining data on individual life span expectations, Mirowsky (1999) finds that men and African Americans appear to be too optimistic, while youths were too pessimistic.

A fundamental problem in assessing the accuracy of these expectations is that we will not know for many years exactly how accurate they were. Cohort mortality is very different than period mortality when mortality rates are changing, and recognizing this is a challenge uniformly faced by researchers, private individuals, and the practitioners who advise them. An implication is that in addition to idiosyncratic uncertainty, there is aggregate

uncertainty about the pace of future mortality decline that clouds individual expectations. Given that actuaries, demographers, and financial advisers, all of whom forecast survivorship for a living, do not always agree on the future of mortality decline, it is particularly interesting to examine how individuals reconcile these competing opinions and formulate their own expectations about mortality far in the future.

In this paper, I reassess differential survivorship expectations by race and sex using cohort rather than period mortality forecasts as my main baseline. The late 1980s and early 1990s were a very interesting time for young African-American adults, and not in a good way, and data from the 1994 Panel Study of Income Dynamics (PSID) on subjective survivorship is illuminating for what it reveals about differences in perceptions by race among a wide range of ages. The Health and Retirement Study (HRS) is fielding its eighth wave this year, and it provides unique insights into survivorship expectations by race among older Americans during more than a decade of mortality decline and updating of beliefs. With the HRS, I can examine the evolution of survivorship expectations both within a cohort and within an age group over time. While I find apparently large departures from rational expectations among most population subgroups, I also uncover tantalizing evidence that individuals do nevertheless perceive mortality decline.

2 Previous literature on mortality expectations

Hamermesh (1985) identified perception of longevity as a central element of economic theory that had not been explored with empirical data. Using survey data on white professional economists, he examined whether expectations regarding the timing of death appeared to be rational. More recent efforts have explored representative survey data that now queries survivorship. Hurd and McGarry (1995) examine how subjective survivorship in the 1992 wave of the HRS reflects individual knowledge of preexisting health conditions, other components of well-being, and behavior, all of which we know ultimately affect mortality. Hurd and McGarry (2002) follow this up by exploring the connections between survivorship expectations, updates, and health events including mortality observed during the HRS panel. Schoenbaum (1997) examines subjective survivorship by smoking behavior in the 1992 HRS. Mirowsky (1999) uses a different dataset, the 1995 survey of Aging, Status, and the Sense of Control, to examine self-reported life expectancies by individual characteristic.

At its heart, this body of research seeks to understand how rational indi-

viduals are in their beliefs regarding future mortality, and there are, unsurprisingly, mixed results. On the one hand, individuals seem to recognize that their current health, socioeconomic status, and behavior will affect their life spans (Hurd and McGarry, 1995; Schoenbaum, 1997). The subjective survivorships they report can also inform us about their actual future mortality (Hurd and McGarry, 2002). But it is much less clear whether survivorship responses are rational expectations in the sense that we would like them to be unbiased estimates of actual *cohort* survivorship. Hamermesh (1985) believes they are, while Mirowsky (1999) says that they are not, reporting that subjective life expectancies look more like period than true cohort life expectancies. With declining mortality rates, period levels of life expectancy and survivorship will be below cohort levels. Montgomery (2000) addresses these issues in the context of developing countries and argues that families are unlikely to perceive mortality decline correctly for cognitive and social reasons.

With new waves of the HRS every 2 years, we are beginning to have enough data to understand how perceptions of mortality are changing over time both within and between cohorts. Another issue of particular importance is how key population subgroups may perceive mortality differently. Recent work by Edwards and Tuljapurkar (2005) has shown that period life span uncertainty is strikingly different for groups within the U.S. stratified by socioeconomic status or race. African Americans, for example, face more variance than whites in their ages at death, in addition to suffering shorter average life spans. We would like to know whether individuals are aware of these stark differences.

3 The data

3.1 Survey data on subjective survivorship

I examine survivorship expectations in two datasets with complementary strengths. The Panel Study of Income Dynamics (PSID) is an ongoing survey of families originally begun in 1968 that in a single wave, 1994, asked household heads of all ages to rate their survivorship probabilities. The Health and Retirement Study (HRS) is a nationally representative panel of individuals over age 50 conducted every two years since 1992. Although question formulation and sample design have evolved over time, the HRS

has recorded survivorship expectations continuously since its inception.[1]

The 1994 wave of the PSID is roughly a cross-sectional snapshot of the U.S. population. Originally a cross-sectional representative sample of individuals in U.S. households combined with an oversample of low-income families with heads under age 60 in 1968, by 1994 the PSID had followed those initial respondents and all children through almost thirty years of aging, fertility, and household transitions. In 1994, the PSID questionnaire included a section on expectations with the following questions:[2]

1. What is the percent chance that you will live to be 75 or more?

2. What is the percent chance that you will live to be 85 or more?

3. What is the percent chance that you will live to be 95 or more?

Household heads under 65 answered questions 1 and 2, those between 65 and 74 answered 2 only, those between 75 and 84 answered 3, and those over 85 were not asked any of the questions.

Originally designed as a representative panel sample of individuals aged 51–61 in 1992 and their households, the HRS was merged in 1998 with a sister panel of individuals originally aged 70 and over, the AHEAD, and new cohorts were added to fill in the age gaps. The new sample design expands the panel to younger cohorts every 6 years in order to maintain representativeness for individuals over age 50. For example, the 2004 wave, which was publicly released in early form in August 2005, includes a new cohort born in 1948 through 1953. In this paper, I examine data from the 1992 HRS and 1993 AHEAD, which cover ages 51–61 and 70+, and I compare them to data from the 2002 HRS, covering ages 50 and over.

In the HRS, respondents are asked to report their subjective survivorships by responding to the following questions:[3]

[1]With funding from the NIA and SSA, the RAND Corporation makes cleaned and standardized HRS data publicly available. I use the RAND HRS data, version E.

[2]The section on expectations in the 1994 PSID began with the following preamble: "Now I would like to ask you about the chance of various events happening to you. Please answer the questions in terms of percent chance. Percent chance must be a number from 0 to 100, where "0" means that there is absolutely no chance and "100" means that it is absolutely certain. For instance, phrases like ... "not much chance" may be around 15 or 20 percent, "an even chance" may be around 45 or 55 percent, and "almost certain" may be around 95 or 98 percent."

[3]In the 1993 AHEAD and 2002 HRS, these questions were introduced as follows:

"Next I have some questions about how likely you think various events might be. When I ask a question I'd like for you to give me a number from 0 to 100, where "0" means that you think there is absolutely no chance, and "100" means that you think the event

1. What is the percent chance that you will live to be 75 or more?

2. What is the percent chance that you will live to be 80 (85/90/95/100) or more?

The first question was not asked of individuals in the 1993 AHEAD, since they were over age 70, nor was it asked of individuals over age 65 in the 2002 HRS. The form of the second question is age-dependent. For HRS 1992 respondents, the target age was 85; for other surveys, it was 80 for those under 70 years of age, 85 for those 70–74, 90 for those 75–79, and so on up to 100 for those 85–89.

Although the survivorship questions in the 1994 PSID and HRS are similar, the differences in sample characteristics preclude many direct comparisons. Rather, the two data sources are complementary in that they provide insights into expectations among different age groups, and one can inform us about the evolution of expectations over time within and between cohorts.

3.2 Life tables by age, sex, and race

The percent chance that an individual will live until age x is his or her *cohort* survivorship, $\ell(x)$. It is easy to imagine that individuals might erroneously conflate this with their *period* survivorship, since the latter tends to be a more widely cited statistic. But when mortality rates are declining, cohort $\ell(x)$ will be higher, especially for younger cohorts.

The Social Security Administration, like other entities that are interested in the actual life spans of individuals, produces and publishes cohort and period life tables. Period life tables are the more visible statistics, and the underlying method of forecasting is based on period trends in age-specific mortality rates, not actual life spans. Bell and Miller (2005) provides both types by single years of age and for males and females separately. I am not aware of official SSA projections of race-specific life tables.

Since race is a key indicator of mortality, I produce my own cohort life tables using the technique of Lee and Carter (1992) applied to mortality

is absolutely sure to happen. For example, no one can ever be sure about tomorrow's weather, but if you think that rain is very unlikely tomorrow, you might say that there is a 10 percent chance of rain. If you think there is a very good chance that it will rain tomorrow, you might say that there is an 80 percent chance of rain."

In the 1992 wave of the HRS, the question was asked slightly differently, with a 10-point response scale. RAND researchers have converted all of these responses to probabilities that vary between 0 and 1 by dividing either by 10 or 100.

rates by age, sex, and race obtained from the National Center for Health Statistics (NCHS). Mortality rates for all races, for whites, and for blacks are available on the NCHS website for the years 1968–1998.[4] I first fit the Lee-Carter singular-value decomposition using data on both sexes and all races combined, recovering a single $b(x)$, or age-specific rate of mortality decline schedule, and a single $k(t)$, or dominant temporal trend in mortality. I forecast $k(t)$ deterministically out to 2100 as a downward linear trend, and to produce mortality forecasts by sex and race, I apply the same $b(x)$ and $k(t)$ to the age-specific mortality rate schedules in 1998 for each of the four sex/race groups: black males, black females, white males, and white females. That is, each group experiences the same annual rates of decline in mortality, but each starts at a different level of mortality.[5] I then produce cohort life tables for the broad age groups in the NCHS data by first taking weighted averages within years of time of adjacent age groups' mortality rates, and then constructing life tables in the standard way.

3.3 Temporal updating and uncertainty in forecasts

Forecasts of future events are updated over time as more information becomes available, and a good forecast recognizes the inherent uncertainties. Cohort life tables produced in a particular year by the Social Security Administration or by using the Lee-Carter technique on currently available data will reflect current knowledge, which includes previous knowledge plus new knowledge. The upshot is that we expect to see that individuals or age groups who forecast their $\ell(x)$ in previous years without access to current knowledge may have forecast either too high or too low depending on what new knowledge suggests, and that their forecasts made today should reflect new knowledge. Although we are dealing with a time span of only about a decade, during which relatively little official updating probably occurred, it is worth considering how prior official forecasts compare to the current ones.

Lee and Miller (2001) show that official mortality projections have tended to be more sensitive to the prevailing short-term trends than has the Lee-

[4] One of the drawbacks of these data is that there are only 11 age groups: age 0–1, 1–4, 5–14, 15–25, and so on until 85+. Another drawback is that there is known age misreporting on death certificates, and infant deaths are frequently mismeasured. Elo (2001) produces life tables for African Americans that are corrected for these problems, but her series ends in 1990 and barely picks up the startling trends in African-American mortality after 1985.

[5] Separate Lee-Carter forecasts for each subgroup would produce starker differences in future mortality that are arguably less realistic. The male/female gap, for example, has displayed trends in the past that have later disappeared or even reversed themselves.

Carter mortality model. Based on this, we can expect official forecasts to be biased either high or low depending on current mortality trends. Comparing the 1997 and 2005 Trustees Reports suggests that during that interval, the Actuaries revised upward their forecasts of annual declines in mortality rates, from about 0.56 percent to 0.71. Based on this alone, we might expect subjective survivorship responses in the early 1990s to be lower than what they would have been with the public information available today.

A second and related point about forecasts is that they are inherently uncertain. Although mortality rates have declined at fairly stable age-specific rates over the past century, they have also wiggled around trend, with the wiggles having appeared to be fairly permanent. The Lee-Carter mortality model accounts for this aggregate uncertainty in mortality, which is distinct from individual or group-level uncertainty about the timing of death relative to the rest of one's cohort. Figure 1 plots the median and 95 percent confidence interval around survivorship for the cohort aged 50 in 2002 using stochastic Lee-Carter mortality forecasts. It shows that in 2002, this cohort may reasonably expect its $\ell(75)$ to vary within a band some 5 percentage points in width, between about 0.72 and 0.77. Ten more years of mortality decline produce an uncertainty band about 8 percentage points in width around $\ell(85)$. The Social Security Administration also produces "high" and "low" forecasts around its "medium" mortality forecast, which capture this same aggregate uncertainty. Bell and Miller (2005) do not present alternative forecasts for either their period or cohort life tables, however.

The bottom line is that we expect there will be much variation in individuals' forecasts of future survivorship. If people use public information to make forecasts, they may revise them, as the Social Security Administration does. An individual with access to Lee-Carter forecasts or the full range of high-medium-low Social Security forecasts would understand there is uncertainty in future survivorship. Since aggregate uncertainty affects all individuals equally, there is no particular reason not to use the median forecast as the baseline, of course. But individuals may differ in their optimism or pessimism about future events.[6] In any event, aggregate mortality uncertainty must be much less important for cross-sectional response variance than individual-level heterogeneity. But its role in explaining changes over time is less clear. If updating of official forecasts is large, it may show up in a panel of individuals' subjective survivorships. Such behavior may still

[6]Individuals may differ in their degree of risk aversion over outcomes that depend on survivorship. We expect rational individuals would still report their best guess of survivorship rather than distort it to reflect that risk aversion over other outcomes, but that is unclear.

essentially reflect fairly accurate perception of mortality decline, but the point to make is that this paper in its present incarnation does not account for periodic updating of official forecasts.

4 Recent trends and the African-American mortality tragedy of the 1980s

Mortality rates for both sexes combined and all races have been declining steadily in the industrialized world since the epidemiological transition of the late 19th century. In the U.S., the age-sex-adjusted mortality rate has fallen at a relatively constant rate over the century, although there were decades with slower or faster decline, and there were high-frequency, transitory deviations from trend. Figure 2 shows the remarkable decline in age-sex-adjusted mortality since 1940 using data from the Social Security Administration (Board of Trustees, 2005).

Beneath this felicitous aggregate view were persistent health disparities, however. For a variety of reasons tied to biological and behavioral differences, male mortality has remained consistently higher than female mortality. Mortality among African Americans has also maintained higher levels throughout the period. Figure 3 depicts stark differences in age-specific mortality rates by race and sex in 1998 according to the NCHS data described earlier.

In addition to persistent disparities, recent decades have also brought alarming deviations in mortality trends by race and sex, although there are signs that these large deviations were temporary, if still relatively long-lived. Figure 4 depicts log age-specific mortality rates among African Americans as identified in NCHS data. After 1985, mortality among blacks aged 15–44 actually trended upward, most precipitously among those aged 15–24. By 1993, African Americans in those ages faced the same mortality rates that prevailed in 1973, twenty years earlier, among the same ages. Mortality at older ages largely maintained earlier trends, as did infant mortality (not shown). After 1993, mortality rates among young adults resumed their downward trend at a slightly faster pace, but the shock in levels of mortality was hardly temporary.

The precise determinants of this divergence in trends, which is not exclusive to black males or females in the NCHS data, remain somewhat unclear. Citing other studies, Elo (2001) describes these mortality increases as "more pronounced for men" and attributable to AIDS, homicides, accidents, cancer, and diabetes. Although Figure 2 does not show any trace of the late

1980s losses, they were felt by some whites as well. The NCHS data reveal that young white males also felt some of this adverse shock in the 1980s, but to a much lesser extent than did young African Americans. Young white females barely experienced any change in trend.

Subjective survivorship among African Americans is especially interesting in light of these trends. We would like to know whether young African Americans in particular perceive their lives as risky as they appear to be. Further, do African Americans envisage the possibility that the tragic period of the late 1980s might repeat itself? Without augmentation, the Lee-Carter mortality model projects past trends in mortality forward, a somewhat controversial technique among actuaries that is only used to inform rather than guide official Social Security forecasts. It would be useful to know how individuals perceive the uncertainty surrounding future mortality, and whether they extrapolate past group-specific trends forward. At a more micro level, expectations of longevity are interesting for what they tell us about attitudes, behaviors, and planning.

5 Subjective survivorship in the 1994 PSID

The 1994 wave of the PSID offers a wide-ranging look at survivorship expectations across groups separated by age, sex, and race. Table 1 displays means and standard deviations of survivorship responses in the 1994 PSID, along with the number of individuals responding in each cell. I focus on survivorship to 75 and 85, $\ell(75)$ and $\ell(85)$, for expositional brevity, because only respondents aged 75–84 were asked and reported $\ell(95)$, and they did not answer the other two questions.[7]

Racial differences in self-reported survivorship are most apparent in the upper-right panel, which shows average $\ell(85)$ by age, race, and sex. African Americans expect higher survivorship to 85 than do whites in almost every age group. Black males expect higher $\ell(85)$ than white females. The female advantage in self-reported survivorship is relatively small among both racial groups. For young African Americans, this can be seen even more starkly in the upper left-hand panel, where the differences in expected $\ell(75)$ between black males and black females are negligible for most groups except those aged 35–44. Only above age 35 do African-American men perceive lower

[7] Differences in $\ell(95)$ across race/sex groups are indeed interesting. All four race/sex subgroups overestimate their conditional $\ell(95)$ relative to what cohort and period life tables suggest are accurate forecasts. Black men are particularly overoptimistic, but black women are less overly optimistic than white women.

$\ell(75)$ than their white counterparts, and among the youngest age group, black men perceive an advantage.

The middle section of Table 1 shows standard deviations of $\ell(x)$ by age, sex, and race. There appear to be two consistent trends: standard deviations in African-American self-reported survivorships are as much as 5 percentage points higher than those of whites, and standard deviations among females are perhaps 2 percentage points higher than males', at least past adolescence.

How accurate are these survivorship expectations? In Table 2, I present average $\ell(75)$ and $\ell(85)$ by age for these four race/sex groups alongside several baseline forecasts. The columns labeled "L-C Cohort" are Lee-Carter forecasts of cohort survivorship for the cell, where I have used the forecasting technique described in Section 3.2. The columns labeled "NCHS Period" are forecasts based on NCHS period mortality rates in 1994, i.e., assuming no mortality decline. For reference, at the far right-hand side of the table, I list Social Security forecasts of cohort survivorship taken from Bell and Miller (2005), which are broken down by age and sex but not race.[8] Alongside them are period survivorships for 1994 produced from the same source, again for all races. In each case, I report conditional survivorships, which are the ratio of $\ell(75)$ or $\ell(85)$ to the current $\ell(x)$ for the cell, where I set x to the midpoint of the age range.

The upper left-hand corner of the table shows white females' self-reported $\ell(75)$ next to their cohort and period $\ell(75)$. Across all ages, white females are more pessimistic than either cohort or period rates suggest they should be. A similar pattern with a twist can be seen among black females in the next panel to the right. Black women are still more pessimistic at every age than the Lee-Carter cohort forecasts suggest, but young black women are actually optimistic relative to current NCHS period mortality rates. They, like the Lee-Carter model, apparently believe that their mortality rates will fall over time.

When we examine $\ell(85)$ in the next panels down, however, the story changes somewhat. White females are still too pessimistic relative to Lee-Carter cohort forecasts, although at younger ages they are actually optimistic relative to NCHS period rates. African-American females are now overly optimistic at every age relative either to cohort or period life tables.

Similarly, African-American males appear to be overestimating $\ell(75)$ and $\ell(85)$ across the board, especially at younger ages. White men are sim-

[8]The SSA Cohort column will not necessarily be a weighted average of the L-C Cohort columns by race because Social Security forecasts typically assume slower rates of mortality decline than Lee-Carter forecasts.

ilarly overexuberant about $\ell(85)$, but their expectations about $\ell(75)$ are pessimistic relative to Lee-Carter cohort forecasts but optimistic relative to NCHS period rates in 1994.

Several general patterns emerge from this analysis. First, none of the four race/sex groups appears to understand how much lower $\ell(85)$ is likely to be than $\ell(75)$, although they do grasp that $\ell(75) \geq \ell(85)$. Hurd and McGarry (1995) found similar patterns in HRS data. White women are by far the most pessimistic or cautious group relative to cohort forecasts and even period rates, even though they report some of the highest survivorship probabilities among the four groups. White men are also too pessimistic about their survivorship to age 75 relative to cohort forecasts, but they are more on target, if not a little too optimistic, about survival to age 85.

We see the sharpest contrast between expectation and forecast in the survivorship of African-American men, especially young cohorts in 1994. Lee-Carter forecasts assume that even after the massive losses against mortality among young African Americans and young white males in the late 1980s, future mortality rates resume a steady pace of decline. But expectations among young black men are still irrationally exuberant even relative to that fairly optimistic baseline. Young black women report survivorships that are actually quite similar in level, but those expectations appear pessimistic relative to cohort forecasts because female mortality is lower. It is also interesting that African-American men aged 55–64, alone among men under 65 surveyed that year, rated their survivorship below what either Lee-Carter forecasts or the 1994 NCHS life table suggests. This seems particularly perplexing since the mortality upswing in the 1980s affected African Americans under 45 exclusively; if any cohort of African Americans is taking such trends into account, it is one that should not.

Considerable heterogeneity in survivorship expectations among these four race/sex groups clouds our perspectives on whether individuals are aware of mortality decline. Males' expectations seem to suggest that they expect future mortality rates to fall, as do those of black females. But white females, the group with the lowest mortality rates, are pessimistic enough to call this point into question. Their survivorship expectations tend to be below what period rates in 1994 imply. It is conceivable that this group of respondents, namely white female heads of household in the 1994 PSID — of which there are relatively few, according to Table 1 — are pessimistic because they are white female heads of household. But black females in these data do not demonstrate quite the same pattern, and they, like black males, are probably also economically disadvantaged.

6 Evolving survivorship expectations in the HRS

With either repeated cross sections or panel data, we can try to get a better angle on how individuals perceive mortality decline. In a single cross section, we can only observe a single forecast for each group, and these forecasts may be erroneous for transitory reasons. A different test of rational expectations is to compare how consecutive birth cohorts at a particular age project their survivorships to a given age in the future. That is, we know that some groups are too optimistic and others are too pessimistic, and thus all are making incorrect forecasts at a point in time. But over time, do their forecasts become increasingly bad, or do they remain wrong by some fixed amount that can be interpreted as a risk or attitude premium? The latter story is more consistent with rationality, although it still raises questions about why subjective survivorship probabilities — statements about a probability distribution and not about values placed on particular outcomes subject to that probability distribution — should display persistent biases.

Also, within a particular cohort over time, we should similarly see increases in subjective survivorship to any given age reported by surviving members of the cohort. Although they may still report biased forecasts, we would certainly expect them to have learned about mortality between surveys. But whether this constitutes knowledge of mortality decline or simply aging and the exposure to mortality itself is hard to disentangle.

Ideally, we would like to see another wave of the PSID ask subjective survivorship, but to my knowledge this has not occurred. We can instead examine the Health and Retirement Study (HRS), which has been asking similarly phrased questions on survivorship roughly every two years since 1992. Two issues presently complicate the analysis, however. First, the original HRS/AHEAD sample only covered the pre-1923 and 1931–1941 birth cohorts, leaving a gap that was not filled until the 1998 wave. Second, the NCHS data I am using in this version of the paper topcodes data into a single age group at 85 and over, so I am unable to provide good forecasts of survivorship by race and sex conditional on surviving to advanced age. Individuals aged 75–79 in the HRS are asked about $\ell(90)$, for example, about which I currently have little to say. As a result, I will report survivorships for older respondents, but I focus on survivorships for ages 50–59 in 1992 and then that age group and those 60–69 ten years later in 2002, the same initial HRS cohort. Mortality has indeed declined quite a bit at advanced ages, but rates of decline have been more rapid at younger ages. Hence much of the story about temporal change is really about adult mortality under age 85, so focusing on $\ell(75)$ and $\ell(85)$ is quite reasonable.

6.1 Survivorships within sample years

Table 3 shows means and standard deviations of subjective survivorships in the 1992 HRS in the same format as used in Table 1 for the 1994 PSID. As in Table 1, the starkest differences can be seen in the upper-right panel of Table 3, where African Americans of both sexes report higher $\ell(85)$ than their white counterparts. In the upper-left, racial differences in self-reported $\ell(75)$ are much narrower, except for the odd blip among men aged 55–59, where African Americans report 7 percentage points more survivorship probability. Standard deviations exhibit the same patterns by race that we see in the PSID, namely that African Americans report survivorships with somewhat greater dispersion. Females in the 1992 HRS do not report with higher dispersion, however, as they do in the 1994 PSID.

Responses from the 1993 AHEAD, which surveyed Americans over 70, are depicted in Table 4. As shown in the second column, each age group's target age about which it is asked is different. We see a large African-American advantage in self-reported survivorship at these advanced ages, with the exception of females aged 75–79. African-American men at these ages believe they face better chances of survival than African-American women of comparable age, a pattern that is also roughly true among white men. Standard deviations in $\ell(\hat{x})$, expected survivorship to the target age, are also higher among African Americans at these ages, which echoes earlier findings at younger ages.

Roughly ten years later, the 2002 HRS surveyed the survivors from these original cohorts and new birth cohorts, and their subjective survivorships are listed in Table 5. At ages below 70, the new target age for the second question, $\hat{x}$, was 80 rather than 85, a change instituted when the HRS and AHEAD were merged in 1998. As in the 1992 AHEAD, at ages above 70, the target age shifts depending on age.

The same pattern of African-American advantage in self-perceived survivorship at more advanced age is evident in the upper right-hand panel of Table 5. This is true even though individuals of both races perceive the female advantage in survivorship somewhat more correctly in this survey. For $\ell(75)$ in the upper left, the latter pattern is even clearer, while the African-American perceived advantage fluctuates across age/sex groups and is less clear. A consistent finding is again that standard deviations in reported probabilities are higher for African Americans than for whites.

Table 6 examines self-reported $\ell(75)$ in the 1992 and 2002 HRS waves relative to Lee-Carter cohort forecasts, current (1992 or 2002) NCHS life tables, and Social Security cohort forecasts and period life tables for all races

combined. Since the NCHS data are aggregated into 10-year age groups, the Lee-Carter cohort forecasts are also specific to 10-year age groups starting at the first age shown in each row, and not the 5-year age groups otherwise used.

We see many of the same patterns we have seen before, but we also find some differences. White females are consistently pessimistic across time, even relative to period life tables and most certainly relative to cohort life tables, or what we expect their survivorship is likely to be. Their $\ell(75)$ can be as much as 10 percentage points below what Lee-Carter cohort forecasts or official Social Security cohort forecasts suggest they should be. What is interesting is that among these ages, African-American and white females basically report exactly the same $\ell(75)$. Black females are more or less correct in their survivorship expectations according to Lee-Carter forecasts, but white females, who should be reporting survivorships between 5 and 10 percentage points higher, are overly pessimistic. Meanwhile, African-American males are more optimistic than period life tables, and rightly so, but they are also more optimistic than cohort forecasts. White men report survivorships that almost look consistent with period life tables and are thus too pessimistic relative to what demographers expect. In the 1994 PSID, white men responded with probabilities between period and cohort $\ell(75)$.

6.2 Survivorships across sample years

The advantage of using the HRS data is that we can compare self-reported survivorship at given ages a number of years apart. Table 7 shows the increase in self-reported and forecast survivorships between 1992 and 2002 for two age groups, 50–54 and 55–59, further decomposed into four race/sex groups as before. Positive numbers indicate increases over time for these ages. White men and women in these age groups did indeed express more optimistic survivorship expectations in 2002 than in 1992, which is consistent with mortality decline.

Strikingly, there are some negative numbers, for black females aged 55–59 and for black males aged 50–54. In both of these age groups, subsequent birth cohorts had lower survivorship expectations than earlier cohorts. If earlier cohorts had unrealistically high expectations, as seems to have been the case among black men, a negative number could indicate a move toward a more realistic self-report. But black women already had realistic expectations, so the decline in $\ell(75)$ for 55–59 year olds seems unwarranted.

For a different perspective, Table 8 takes the cohort view, subtracting $\ell(75)$ recorded among ages 50–59 in 1992 from $\ell(75)$ recorded in 2002 among

the surviving members of the same birth cohort. Lee-Carter and Social Security forecasts uniformly confirm that the upward revision in $\ell(75)$ for these surviving individuals should be large, especially for African-American men, given accurate initial forecasts. Except for African-American men in the 1933–1937 birth cohort, who were 55–59 in 1992, all surviving cohorts did indeed upgrade their expected survivorship. But across the board, revisions were not as large as they should have been. White women in the 1938–1942 birth cohort, in particular, raised their $\ell(x)$ by a very small amount, only 0.7 percentage point. That was well short of the 5–8 percentage points suggested by various forecasts and period life tables.

7 Discussion

It is not surprising to find that individuals do not know their cohort life tables as well as actuaries and demographers do. Forecasting mortality is a computationally intensive and sometimes intellectually contentious pursuit, and even official forecasts vary quite a bit from year to year. Still, examining self-reported survivorship probabilities, a relatively recent addition to representative surveys, provides many insights into individual perception.

The first part of this paper examined survivorship expectations by race and sex among a wide cross section of ages using the 1994 wave of the PSID. One of the most interesting results is that young African-American males report survivorships that are probably much too optimistic, by about ten percentage points. Young black females report roughly the same survivorship probabilities, but in their case those forecasts are probably slightly pessimistic, since females enjoy lower mortality rates.

Optimism on the part of young black males about survivorship makes an odd bedfellow with high crime rates, low college attendance, and low saving rates, all behaviors that we would typically associate with shorter, not longer, time horizons. On the other hand, carefree and unrealistic optimism may reflect carefree and thus risky behavior. It is this theme, if any, that we see echoed in the pessimism of female survivorship expectations. We know that females have historically been less prone to engage in risky behavior such as smoking and drinking. Paradoxically, we might expect that an excessively cautious perspective on survivorship could well go hand-in-hand with precisely the kind of cautious behavior that produces higher survivorship. Are these expectations then irrational, or self-fulfilling?

It is certainly possible that misperception reflects either a lack of information or understanding, however, rather than behavioral differences. But the

direction of bias stemming from either of those sources is less immediately clear. In addition, we might expect that information and comprehension are probably relatively similar between sexes among socioeconomic strata, but that is not what we find.

Another issue hinted at by Hurd and McGarry (2002) is that female perceptions of survivorship may not be fully reflective of true female survivorship because of the proximity of males. Individuals may learn about survivorship from others' experiences, and they may not adjust properly for the sex composition of their observations. Another relevant issue is whether females, being the longer-lived, place undue emphasis on the shorter survivorship of (potential) male partners. Certainly in forming household decisions, it is probably the joint survivorship of the couple that most heads care about, rather than individual survivorship, so it may be that survey respondents have the former in mind when they answer.

Given the heterogeneity in perceptions by race, sex, and age that we see in the 1994 PSID, the paper next considered how perceptions may be changing over time within subgroups. If individuals do update their beliefs over time, why they might maintain persistent biases that will ultimately be proved wrong is an interesting question. If they do not update their beliefs, then that of course is a cause for great concern.

I find decidedly mixed results on updating beliefs over time. Subsequent cohorts do seem to understand that mortality decline is happening. Individuals aged 50–59 in the 2002 HRS generally reported higher survivorships to age 75 than their ten-year older counterparts did in 1992. But the average over 8 age/race/sex subgroups was an increase of about 1.5 percentage points in $\ell(75)$ over those 10 years. Social Security cohort forecasts averaged 2.4 percentage points for those ages, Lee-Carter cohort forecasts averaged 3.8, and changes in NCHS period life tables suggested an increase of 3.6 percentage points. In addition to the suboptimal average amount of updating for that age group, there was considerable subgroup heterogeneity in updating by age, race, and sex.

Evidence of updating over time among surviving members of a particular cohort paints a very similar picture. Individuals aged 50–59 in 1992 who survived to repeat their forecasts of $\ell(75)$ in 2002 did indeed update them, as they should have simply because they survived. But they did not update them very much relative to cohort-based forecasts or changes in period life tables. And again, there was considerable subgroup heterogeneity.

Altogether, it would appear that while these subjective survivorships are suggestive of a fundamental understanding of mortality decline on some level, they also reflect some deep-seated psychological tendencies that seem

to follow certain patterns across identifiable groups. While predispositions toward optimism or pessimism do not overwhelm perceptions of survivorship so completely that the latter do not evolve over time, there is also no sign that they are dying out. A clear challenge for research is to identify how these elicited perceptions about survivorship are connected to life-cycle behavior, and what can be done to improve perceptions and opportunities.

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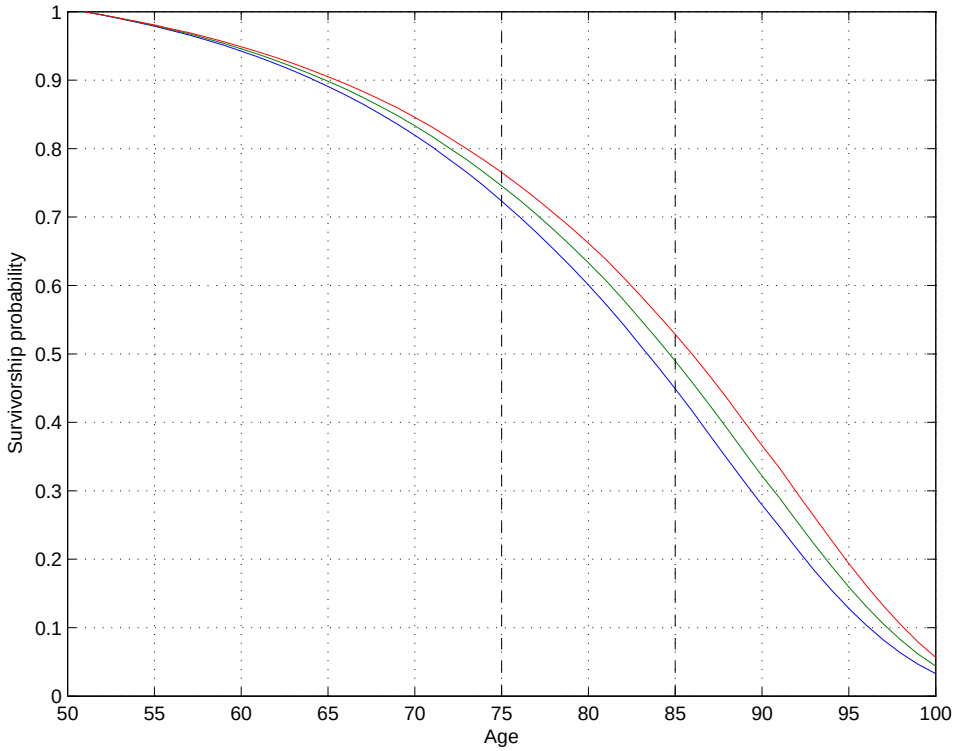
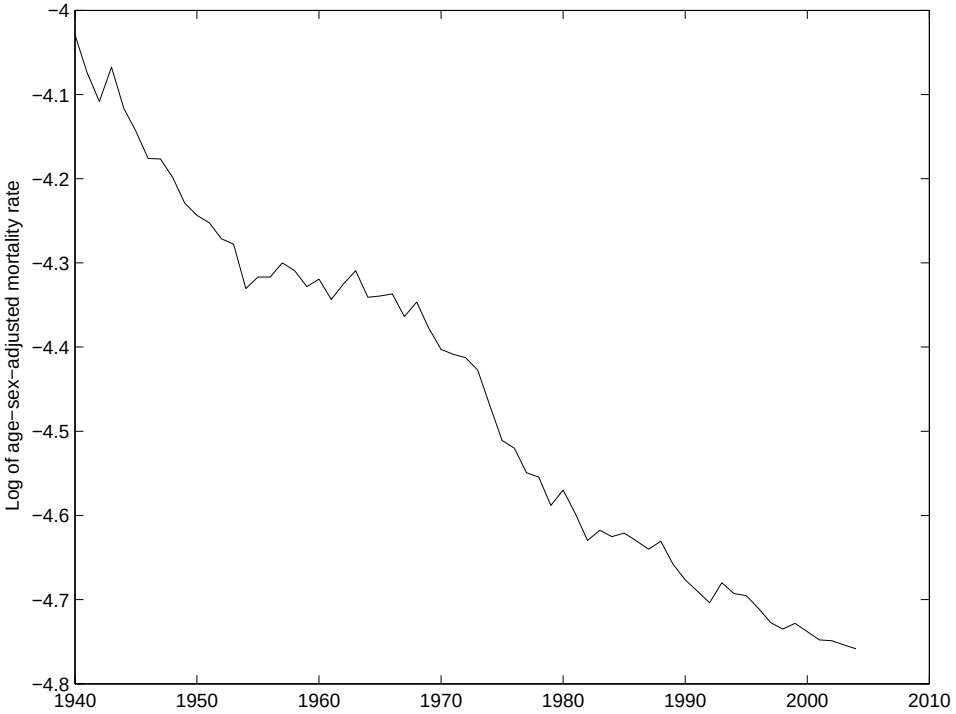
Figure 1: Uncertain survivorship for the cohort aged 50 in 2002



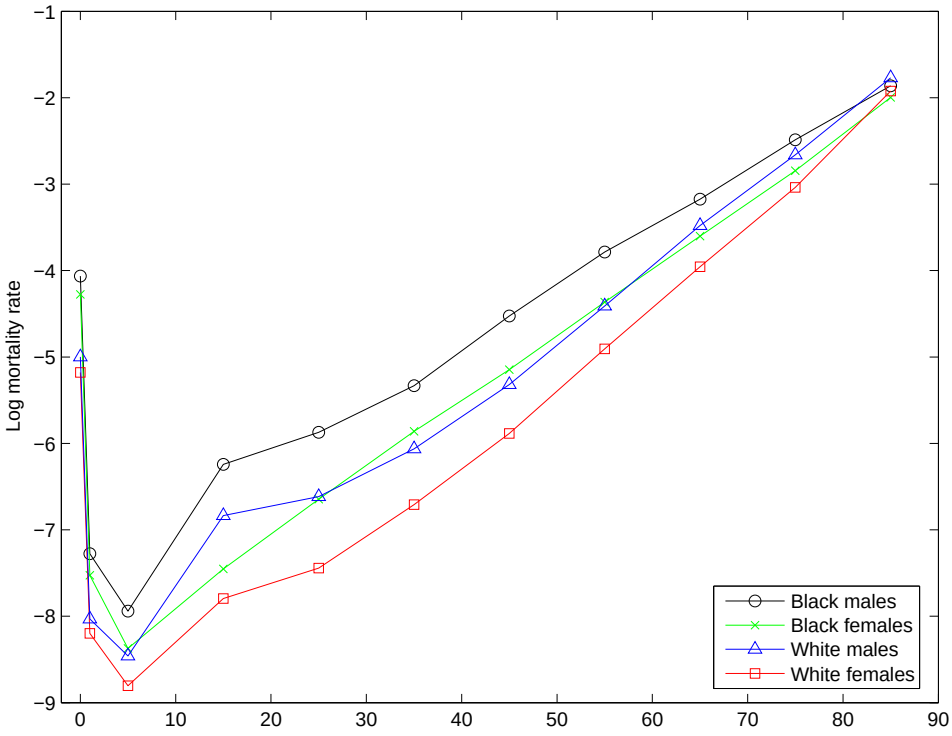
Notes: This plot shows the median and 95 percent confidence intervals around forecast survivorship for the cohort aged 50 in 2002, both sexes and all races combined. Forecasts are produced using the model of Lee and Carter (1992) applied to data in single years of age from the Human Mortality Database (2006). The confidence interval reflects aggregate mortality uncertainty alone, not individual or group-level uncertainty about the length of life.

Figure 2: Log age-sex-adjusted mortality rates in the U.S. since 1940



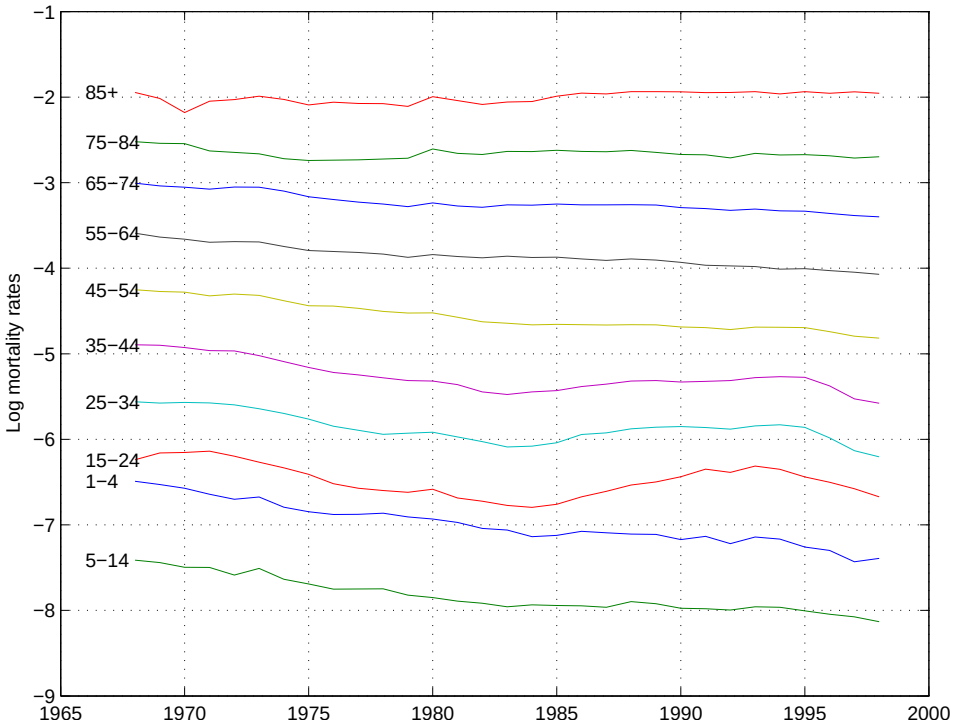
Source: Social Security Administration (Board of Trustees, 2005).

Figure 3: Log age-specific mortality rates by race and sex in 1998



Source: National Center for Health Statistics.

Figure 4: Log age-specific mortality rates among African Americans since 1968



Source: National Center for Health Statistics. For expositional purposes, mortality rates under age 1 are not shown.

Table 1: Self-reported survivorship in the 1994 PSID by race and sex

	$\ell(75)$				$\ell(85)$			
Age	White Females	Black Females	White Males	Black Males	White Females	Black Females	White Males	Black Males
	Means							
15–24	68.4	68.8	63.6	67.9	50.8	59.6	45.3	57.6
25–34	67.1	64.6	64.9	64.8	49.3	55.8	46.1	54.6
35–44	63.6	64.8	64.2	61.8	45.2	54.2	42.8	47.7
45–54	62.1	56.5	63.3	56.0	41.1	45.3	40.2	46.0
55–64	59.2	54.2	60.1	53.0	42.4	42.5	37.8	43.4
65–74					48.9	50.8	45.1	41.2
	Standard deviations							
15–24	24.7	26.9	27.4	30.1	26.5	31.6	27.8	30.8
25–34	26.6	28.4	24.4	29.1	28.7	30.7	26.5	31.8
35–44	27.9	31.1	25.9	28.4	31.2	33.9	27.5	30.4
45–54	29.6	34.2	25.7	30.4	29.6	34.7	27.4	31.7
55–64	28.1	33.8	27.2	32.1	31.2	35.5	28.9	34.9
65–74					31.0	35.4	27.0	34.2
	Number of observations							
15–24	196	295	510	201	196	295	508	201
25–34	430	938	2,662	1,322	426	941	2,662	1,329
35–44	505	1,024	3,909	1,634	501	1,029	3,900	1,641
45–54	244	249	2,150	693	244	237	2,146	691
55–64	132	237	775	304	130	232	791	299
65–74					196	176	621	203

Notes: Data are from the 1994 Panel Study of Income Dynamics (PSID) and are the means, standard deviations, and number of observations for the responses to the questions about subjective survivorship to age 75 and 85, $\ell(75)$ and $\ell(85)$, which are listed in the text.

Table 2: Self-reported survivorship in the 1994 PSID and projections

	White			**Black**			**All Races**	
	Self Report	L-C Cohort	NCHS Period	Self Report	L-C Cohort	NCHS Period	SSA Cohort	SSA Period
$\ell(75)$				**Females**				
15–24	68.4	81.6	72.4	68.8	72.8	58.6	77.6	71.0
25–34	67.1	79.5	72.8	64.6	70.0	59.3	76.5	71.4
35–44	63.6	77.5	73.4	64.8	67.6	60.8	75.7	72.1
45–54	62.1	76.2	75.0	56.5	66.8	63.8	75.7	73.6
55–64	59.2	77.4	79.1	54.2	69.6	70.3	78.5	77.6
$\ell(85)$				**Females**				
15–24	50.8	58.9	44.3	59.6	51.0	32.3	54.3	42.1
25–34	49.3	55.6	44.5	55.8	47.2	32.7	52.2	42.4
35–44	45.2	52.3	44.9	54.2	43.8	33.6	50.0	42.8
45–54	41.1	49.4	45.9	45.3	41.3	35.2	48.2	43.7
55–64	42.4	48.0	48.4	42.5	40.9	38.8	48.1	46.1
65–74	48.9	51.0	55.2	50.8	45.7	47.4	53.1	52.5
$\ell(75)$				**Males**				
15–24	63.6	71.7	56.5	67.9	59.0	37.7	68.5	54.8
25–34	64.9	69.0	57.4	64.8	55.6	39.1	67.1	55.7
35–44	64.2	66.4	58.7	61.8	52.7	41.4	66.1	57.0
45–54	63.3	65.0	61.2	56.0	52.1	45.7	65.9	59.3
55–64	60.1	66.8	67.1	53.0	56.9	54.7	68.7	65.0
$\ell(85)$				**Males**				
15–24	45.3	46.6	26.0	57.6	36.9	14.6	41.6	23.8
25–34	46.1	42.9	26.4	54.6	33.1	15.1	39.2	24.2
35–44	42.8	39.3	27.0	47.7	29.6	16.0	36.9	24.8
45–54	40.2	36.4	28.2	46.0	27.5	17.7	35.0	25.8
55–64	37.8	35.2	30.9	43.4	27.9	21.2	34.3	28.2
65–74	45.1	39.3	38.6	41.2	33.8	29.7	38.8	35.2

Notes: Average self-reported survivorships appear in the columns labeled "Self Report" and are taken from the 1994 wave of the PSID. The columns labeled "L-C Cohort" are Lee-Carter forecasts of cohort survivorship that take NCHS mortality data by race and sex from 1968 to 1998 and forecast using a single set of age-specific rates of decline for all four race/sex groups. The columns labeled "NCHS Period" are NCHS period survivorship ratios for 1994. The columns labeled "SSA Cohort" and "SSA Period" show forecasts of cohort survivorship and period survivorship by sex for all races combined, which are provided by the Social Security Administration (Bell and Miller, 2005). All the statistics shown are conditional survivorships; e.g. $\ell(75)/\ell(x)$, where x is current age.

Table 3: Self-reported survivorship in the 1992 HRS by race and sex

	$\ell(75)$				$\ell(85)$			
Age	White Females	Black Females	White Males	Black Males	White Females	Black Females	White Males	Black Males
	Means							
50–54	66.7	66.5	61.4	61.7	46.2	50.5	38.6	45.6
55–59	65.1	66.2	61.4	68.4	43.7	51.0	36.9	48.5
	Standard deviations							
50–54	27.9	30.5	29.9	33.8	31.3	34.9	30.5	35.4
55–59	29.7	30.9	30.3	31.5	31.8	34.1	31.2	36.1
	Number of observations							
50–54	1,787	398	1,396	259	1,783	394	1,397	258
55–59	1,694	415	1,466	288	1,688	413	1,465	288

Notes: Data are from the 1992 Health and Retirement Study (HRS) and are the means, standard deviations, and number of observations for the responses to the questions about subjective survivorship to age 75 and 85, $\ell(75)$ and $\ell(85)$, which are listed in the text.

Table 4: Self-reported survivorship in the 1993 AHEAD by race and sex

		$\ell(\hat{x})$			
Age	Target Age, $\hat{x}$	White Females	Black Females	White Males	Black Males
		Means			
70–74	85	50.0	58.6	49.5	62.5
75–79	90	39.1	35.5	37.1	49.5
80–84	95	28.9	43.8	32.0	44.6
85–89	100	27.9	42.5	29.9	44.9
		Standard deviations			
70–74	85	32.6	36.6	32.2	33.8
75–79	90	34.3	36.2	32.1	36.7
80–84	95	33.7	38.3	34.4	37.4
85–89	100	33.5	38.3	33.9	31.1
		Number of observations			
70–74	85	1,152	159	813	85
75–79	90	856	104	557	56
80–84	95	575	68	375	46
85–89	100	273	42	165	16

Notes: Data are from the 1993 Study of Assets and Health Dynamics Among the Oldest Old (AHEAD) and are the means, standard deviations, and number of observations for the responses to the questions about subjective survivorship to the target ages listed in the table, $\hat{x}$. The question phrasing is given in the text.

Table 5: Self-reported survivorship in the 2002 HRS by race and sex

		$\ell(75)$				$\ell(\hat{x})$			
Age	Target Age, $\hat{x}$	White Females	Black Females	White Males	Black Males	White Females	Black Females	White Males	Black Males
		Means							
50–54	80	67.7	71.1	62.6	61.0	53.2	65.0	47.8	53.6
55–59	80	68.6	65.1	62.1	71.2	54.6	58.1	47.9	57.5
60–64	80	67.4	68.5	64.6	66.3	55.7	61.9	48.7	57.5
65–69	80	68.5	70.3	67.5	65.9	58.8	61.7	55.1	60.1
70–74	85					52.3	56.7	50.4	58.2
75–79	90					39.9	53.7	39.2	55.4
80–84	95					31.9	38.0	29.2	37.9
85–89	100					23.0	40.4	25.2	41.4
		Standard deviations							
50–54	80	25.8	30.0	29.0	31.6	28.0	32.1	30.1	31.1
55–59	80	26.4	32.2	28.9	28.8	28.8	32.8	29.5	35.1
60–64	80	27.4	33.2	27.0	32.0	29.6	34.4	28.3	33.4
65–69	80	27.1	31.2	27.5	31.9	28.6	34.1	28.6	32.5
70–74	85					30.3	34.9	30.4	32.4
75–79	90					31.3	40.2	30.6	35.4
80–84	95					30.9	33.6	30.9	33.5
85–89	100					30.6	37.5	29.8	38.0
		Number of observations							
50–54	80	441	66	112	20	422	65	108	18
55–59	80	1,077	210	627	82	1,039	194	595	81
60–64	80	1,430	289	1,126	160	1,368	265	1,078	150
65–69	80	299	53	207	35	1,263	253	983	144
70–74	85					1,012	132	828	83
75–79	90					833	70	617	48
80–84	95					681	68	418	39
85–89	100					295	35	180	19

Notes: Data are from the 2002 Health and Retirement Study (HRS) and are the means, standard deviations, and number of observations for the responses to the questions about subjective survivorship to 75 and to the target ages listed in the table, $\hat{x}$. The question phrasing is given in the text.

Table 6: Self-reported survivorship to age 75 in the 1992 and 2002 HRS and projections

	White			**Black**			**All Races**	
Age	Self Report	L-C Cohort	NCHS Period	Self Report	L-C Cohort	NCHS Period	SSA Cohort	SSA Period
ℓ(75)	**Females in 1992**							
50–54	66.7	75.7	75.6	66.5	66.8	64.3	75.3	73.7
55–59	65.1		77.4	66.2		67.3	76.6	75.6
ℓ(75)	**Males in 1992**							
50–54	61.4	64.3	61.4	61.7	52.5	46.2	65.1	58.0
55–59	61.4		64.1	68.4		50.2	65.9	60.7
ℓ(75)	**Females in 2002**							
50–54	67.7	78.5	77.2	71.1	70.4	67.3	77.0	74.8
55–59	68.6		78.8	65.1		70.0	77.9	76.6
60–64	67.4	82.0	81.6	68.5	76.3	74.3	80.1	79.4
65–69	68.5		86.2	70.3		80.8	84.6	84.2
ℓ(75)	**Males in 2002**							
50–54	62.6	68.3	65.6	61.0	57.3	52.4	68.3	63.1
55–59	62.1		67.9	71.2		56.2	69.3	65.6
60–64	64.6	73.5	71.9	66.3	66.5	62.4	72.1	69.6
65–69	67.5		78.5	65.9		71.6	77.5	76.3

Notes: Average self-reported survivorships to 75, $\ell(75)$, appear in the columns labeled "Self Report" and are taken from the 1992 and 2002 waves of the HRS. The columns labeled "L-C Cohort" are Lee-Carter forecasts of cohort survivorship that take NCHS mortality data by race and sex from 1968 to 1998 and forecast using a single set of age-specific rates of decline for all four race/sex groups. The columns labeled "NCHS Period" are NCHS period survivorship ratios for 1992 or 2002. The columns labeled "SSA Cohort" and "SSA Period" show forecasts of cohort survivorship and period survivorship by sex for all races combined, which are provided by the Social Security Administration (Bell and Miller, 2005). All the statistics shown are conditional survivorships; e.g. $\ell(75)/\ell(x)$, where x is current age.

Table 7: Changes in self-reported survivorship to age 75 at ages 50–59 between the 1992 and 2002 HRS and projections

	White			**Black**			**All Races**	
Age	Self Report	L-C Cohort	NCHS Period	Self Report	L-C Cohort	NCHS Period	SSA Cohort	SSA Period
$\Delta\ell(75)$	**Females**							
50–54	0.9	2.8	1.6	4.6	3.6	3.0	1.7	1.2
55–59	3.5		1.4	−1.1		2.7	1.3	1.0
$\Delta\ell(75)$	**Males**							
50–54	1.2	3.9	4.2	−0.7	4.8	6.2	3.1	5.2
55–59	0.7		3.9	2.8		6.0	3.4	4.9

Notes: This table compares self-reported survivorships reported by an age group (i.e., different individuals) in 1992 and 2002. Changes in average self-reported survivorships to 75, $\ell(75)$, between 1992 and 2002 appear in the columns labeled "Self Report" and are taken from the 1992 and 2002 waves of the HRS. The columns labeled "L-C Cohort" are changes in Lee-Carter forecasts of cohort survivorship that take NCHS mortality data by race and sex from 1968 to 1998 and forecast using a single set of age-specific rates of decline for all four race/sex groups. The columns labeled "NCHS Period" are changes in NCHS period survivorship ratios between 1992 and 2002. The columns labeled "SSA Cohort" and "SSA Period" show changes in forecasts of cohort survivorship and period survivorship by sex for all races combined, which are provided by the Social Security Administration (Bell and Miller, 2005). All the statistics shown are conditional survivorships; e.g. $\ell(75)/\ell(x)$, where x is current age.

Table 8: Changes in self-reported survivorship to age 75 among the birth cohort aged 50–59 in 1992 in the 1992 and 2002 HRS and projections

	White			**Black**			**All Races**	
Birth Cohort	Self Report	L-C Cohort	NCHS Period	Self Report	L-C Cohort	NCHS Period	SSA Cohort	SSA Period
$\Delta\ell(75)$	**Females**							
1938–42	0.7	6.3	6.1	2.0	9.5	10.0	4.8	5.8
1933–37	3.4		8.8	4.1		13.5	8.0	8.6
$\Delta\ell(75)$	**Males**							
1938–42	3.3	9.2	10.5	4.6	13.9	16.3	7.0	11.6
1933–37	6.1		14.5	−2.6		21.4	11.7	15.6

Notes: This table compares self-reported survivorships reported by cohorts in 1992 and 2002. Changes in average self-reported survivorships to 75, $\ell(75)$, between 1992 and 2002 appear in the columns labeled "Self Report" and are taken from the 1992 and 2002 waves of the HRS. The columns labeled "L-C Cohort" are changes in Lee-Carter forecasts of cohort survivorship that take NCHS mortality data by race and sex from 1968 to 1998 and forecast using a single set of age-specific rates of decline for all four race/sex groups. The columns labeled "NCHS Period" are changes in NCHS period survivorship ratios between 1992 and 2002. The columns labeled "SSA Cohort" and "SSA Period" show changes in forecasts of cohort survivorship and period survivorship by sex for all races combined, which are provided by the Social Security Administration (Bell and Miller, 2005). All the statistics shown are conditional survivorships; e.g. $\ell(75)/\ell(x)$, where x is current age.