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# Introduction

David A. Wise

This is the sixth in a series of volumes on the economics of aging. The previous ones were *The Economics of Aging*, *Issues in the Economics of Aging*, *Topics in the Economics of Aging*, *Studies in the Economics of Aging*, and *Advances in the Economics of Aging*. The papers in this volume cover aspects of health insurance and the increase in the cost of health care, retirement and caring for the elderly, and several methodological and data issues that will help to pave the way for future analysis. The papers are summarized in this introduction, which draws heavily on the authors' own summaries.

## **Health Insurance and the Cost of Health Care**

### Medical Saving Accounts

In "Insurance or Self-Insurance? Variation, Persistence, and Individual Health Accounts," Matthew Eichner, Mark McClellan, and I consider the feasibility of medical saving accounts as a means of helping to efficiently control health care costs. We conclude that medical saving accounts do offer a feasible way to provide medical insurance that helps to assure that the cost of care is matched by a corresponding benefit to the patient.

Economists have for some time emphasized the desirable incentive properties of catastrophic health insurance. Under such a system individuals would pay for their own health care unless the expenses were very large. Thus the temptation to spend too much, the "moral hazard," that is created by typical insurance provisions would be reduced or eliminated. A practical argument

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against catastrophic insurance, however, is that a very large fraction of families have almost no liquid savings and would find it hard to make even small out-of-pocket payments, especially if they were not anticipated. Perhaps in recognition of this fact, employees have shown a willingness to pay very high premiums to avoid uncertainty about health expenditures, and many firms have experienced very low participation rates in “major medical” plans with substantial deductibles even though these plans are typically offered at generously low premiums.

The attention of American health reformers in recent years has turned to managed care plans, which place little reliance on “demand” incentives, instead using “supply side” and contractual restrictions to limit spending under insurance plans with low deductibles and copayments. Apparently, such plans have had some success in limiting health expenditures, although at the cost of increased regulation of doctor-patient transactions. But, *ex post*, insured patients bear only a small fraction of the cost of their care, suggesting that incentives for cost control are far from optimal. We begin with this paper a research agenda that emphasizes—and maybe reconsiders—price incentives in health insurance reform.

We explore the feasibility of catastrophic health insurance established in conjunction with individual health accounts (IHAs). Such an arrangement holds the potential for both reducing health care cost and encouraging saving. Under this plan, the employer establishes both a high-deductible health insurance plan and an IHA. Annual contributions to the IHA are equal to a substantial fraction of the deductible. Employee health care costs below the deductible are then paid out of the IHA; costs above the deductible are paid by the insurance plan. Assets remaining in the account when the employee retires, or becomes Medicare eligible, are then available for other purposes. The motivation for the parallel saving and insurance plans, of course, is that each employee is spending his or her “own” money for medical care, except in the event of serious illness. The plan thus combines the desirable features of catastrophic coverage for reducing medical expenditures with a mechanism that creates a reserve from which individual expenses can be paid.

But even if the IHA component provides the necessary liquidity, it may still be thought to be inequitable. To the extent that individuals experience different health shocks over many years, the plan could lead to large differences in IHA accumulations. A person who is never sick will accumulate large IHA balances, while someone who is always sick will accumulate nothing. If individual health expenditures over a working lifetime vary little, all persons will have the same IHA balance at retirement. On the other hand, if average individual expenditures vary widely over the working life, the plan may look like a savings plan to the healthy and self-insurance to the chronically ill.

Because individual health shocks clearly vary, the feasibility of an IHA plan depends on whether the gains (improved incentives for efficient health care spending and increased savings) outweigh the costs (more variation in individ-

ual health care costs than under more generous insurance plans). Indeed, we believe that in practice feasibility may depend largely on what the variation in IHA balances would “look like.” Thus, as a crucial first step, we address that issue in this paper. Within the context of an illustrative IHA plan, we develop preliminary empirical evidence on the distribution of medical expenditures—and hence savings—under an IHA plan. Our analysis is based on longitudinal health insurance claims data from a large firm. In this analysis, we assume no behavioral response whatever to the increased cost sharing under an IHA plan.

We emphasize the balance in the IHA account at retirement. Although such a plan would produce a range of balances across employees, approximately 80 percent would retain over 50 percent of their contributions. Only about 5 percent would retain less than 20 percent of their contributions. The outcomes suggest to us that such a plan is feasible. And we believe that such a plan could be structured to increase retirement savings.

### Medical Technology and Cost Increases

In “What Is Technological Change?” David Cutler and Mark McClellan examine the sources of health care expenditure growth, emphasizing the important effect of the diffusion of medical technology. The rising cost of health care has been among the most vexing problems facing the public sector in the past three decades. Spending on health care accounts for nearly 20 percent of federal revenues, and a similar share of state and local revenues. With real per capita health costs increasing by 4 to 5 percent annually, understanding the determinants of health care cost growth has become a substantial public concern.

Efforts to limit cost growth in the public sector have typically focused on price mechanisms. By lowering rates for the services it pays for, the federal government has hoped to limit overall reimbursement for medical care. And yet health costs continue to rise. Real per enrollee Medicare costs increased by over 6 percent annually between 1991 and 1993.

Cutler and McClellan explore the causes of this cost growth in detail. They begin with a discussion of the growth of inpatient Medicare costs. They show that the price that Medicare pays for admissions has been falling over time but the technological intensity of the treatment has been increasing. Since more intensive technologies are reimbursed at a higher rate than less intensive technologies, the growth of technology is at least partly responsible for the growth of Medicare costs.

To gain further insights into these trends, they turn to a detailed analysis of expenditure growth for one particular condition—acute myocardial infarctions (AMIs), or heart attacks, in elderly Medicare beneficiaries. The technologies used in treating AMI have progressed dramatically in the past decade. In the early 1980s, treatment for heart attacks consisted principally of medical management of the patient, primarily involving monitoring techniques, pharmacologic interventions, and counseling. During the 1980s, several new intensive

technologies were implemented widely. These technologies, the authors show, including cardiac catheterization, coronary artery bypass surgery, and coronary angioplasty, have had major consequences for patient treatment. The authors then quantify the effects of the technologies on Medicare expenditures. In 1984, about 11 percent of people with a heart attack received one or more of these intensive treatments. Over the next seven years, the use of these treatments nearly quadrupled. As a result, even though the price of AMIs was constant or even falling, spending on heart attacks rose by 4 percent annually.

The authors then begin to develop evidence on the nature of this technological change by comparing the growth of technology across metropolitan statistical areas (MSAs). They consider a common contention—that new and cheaper technologies will substitute for older and more expensive technologies and thus lower costs. The most recent innovation for AMI treatment, angioplasty, is substantially cheaper than bypass surgery; thus substitution of angioplasty for bypass surgery could potentially reduce cost growth. Looking across MSAs, however, they find no evidence that areas with more rapid growth of angioplasty have had less rapid growth of bypass surgery. Thus they conclude that angioplasty has added significantly to the cost of AMI treatment by extending intensive interventions to a larger segment of AMI patients. Looking across MSAs, they find that some MSAs are technology “leaders” and others are “followers.” Areas in which bypass surgery was more prevalent in 1984 are the first to adopt angioplasty, and they use this procedure more often.

Finally, the authors begin to explore the sources of intensity growth within geographic areas by considering the contribution of technology acquisition by hospitals to intensity growth. They find that technology diffusion to new facilities accounts for much intensity growth, but that more frequent use of intensive technologies within hospitals is also important, especially for the continued growth of relatively “established” technologies such as bypass surgery.

## **Retirement and Care of the Elderly**

### **Is Retirement Saving Used for Retirement?**

Personal retirement saving and employer-provided pension plans that may provide a lump sum to the employee at retirement or on earlier departure from the firm are becoming an increasingly important form of retirement saving. An important concern is whether these lump-sum distributions are in fact saved for retirement or used for other purposes. In “Lump-Sum Distributions from Retirement Saving Plans: Receipt and Utilization,” James Poterba, Steven Venti, and I address this question, concluding that the vast majority of the funds, but a smaller proportion of individual accounts, do remain in retirement saving accounts.

The degree to which alternative pension systems preserve retirement benefits when individuals change jobs has long been a consideration in evaluating

various retirement saving arrangements. Related preservation issues have also been raised with respect to targeted retirement saving accounts, such as individual retirement accounts (IRAs) and 401(k) plans, which permit contributors to withdraw funds, subject to a tax penalty, before they reach retirement age. As the incidence of targeted retirement saving plans increases, the number of taxpayers with the potential to trigger such withdrawals will also increase. Although a number of previous studies, including our own, have examined the determinants of participation and contribution behavior in retirement saving plans, withdrawal behavior has received much less attention.

The incidence and disposition of withdrawals from pension plans or other saving plans, known as lump-sum distributions, is a key determinant of the financial status of elderly households. Consider a 35-year-old who has accumulated \$10,000 in a defined contribution (DC) pension plan, and who changes jobs. If these funds remain in a DC pension account and earn a 5 percent annual real return, the balance in this plan will be \$44,817 when the beneficiary reaches age 65. If these funds are withdrawn and consumed when the pension plan participant changes jobs, however, they will not contribute to his financial well-being in retirement. Because a high fraction of lump-sum distributions occur when individuals change jobs early in their employment careers, withdrawing such assets forgoes the opportunity for many years of compound accumulation at pretax rates of return.

We consider the incidence and disposition of lump-sum distributions from pension plans and targeted retirement saving accounts and present exploratory empirical evidence on recipient characteristics that are correlated with the decision to rollover such distributions and preserve their associated retirement benefits. Although we are particularly interested in withdrawals from IRAs and 401(k) plans, we are not aware of any data source that provides detailed information on these withdrawals as distinct from distributions from employer-provided DB and DC pension plans. At least historically, payouts from pension plans are likely to account for the substantial majority of distributions. We therefore explore the general pattern of receipt and utilization of all distributions.

Using information from both the Current Population Survey and the Health and Retirement Survey, we demonstrate that lump-sum distributions are common and that most small distributions are not rolled over into qualified retirement saving accounts. Most large distributions are rolled over, however, and the fraction of distribution *dollars* that are reinvested in saving vehicles is substantially greater than the fraction of *distributions* that are reinvested. At least 80 percent of the dollar amount of distributions is either rolled over into an IRA or other pension plan, used to buy an annuity, or saved in another form. We also document a number of clear patterns with respect to the allocation of lump-sum distributions. More educated workers, older workers, and higher income workers are more likely to roll these distributions into some type of retirement saving account.

## Medical Insurance and Retirement

Saving for retirement and the preservation of such saving speak to the preparation for retirement. The determinants of retirement have been emphasized extensively in prior volumes in this series. The effects of the provisions of employer-provided pension plans and the provisions of the social security system have received particular attention. Brigitte Madrian and Nancy Dean Beaulieu consider another potentially important influence on when people choose to retire. In “Does Medicare Eligibility Affect Retirement?” they consider whether the availability of Medicare insurance influences the timing of retirement. Based on the evidence that they develop, they conclude that it does.

Concern over the lack of portability associated with employer-provided health insurance has precipitated a recent flurry of research activity on the effects of health insurance on labor market outcomes. Several estimates suggest that the costs associated with changing doctors and losing coverage for preexisting conditions are sufficient to deter some individuals from changing jobs. These costs may be particularly important for older individuals contemplating retirement because a departure from the labor force may involve not only a change in doctors or lack of coverage for preexisting conditions but a complete loss of access to employer-provided group health insurance.

Although all individuals are eligible for government-provided group health insurance—Medicare—on reaching age 65, most individuals say that they would like to retire before age 65. In contrast with social security, however, there is no early retirement age before 65 when individuals qualify for Medicare. For some, this is not an issue because their employers provide postretirement health insurance benefits. The majority of workers, however, are not entitled to such benefits because their employers do not offer them. It is these workers whom we would expect to be most concerned about how early retirement will affect their health insurance coverage.

Understanding the role of health insurance in retirement decisions is important because the government is currently trying to encourage later retirement by increasing the social security normal retirement age to 67 in the future. There has been some talk about increasing the age of Medicare eligibility correspondingly. Madrian and Beaulieu emphasize, however, that health care reform that makes health insurance more portable from work to retirement may undermine this goal if the potential loss or change in health insurance coverage that currently exists is a significant deterrent to retirement.

Much of the emerging literature on health insurance and retirement has examined the impact of employer-provided retiree health insurance on retirement, concluding that such health insurance constitutes a significant inducement for early retirement. In contrast, there is little compelling evidence on the effect of Medicare. Madrian and Beaulieu consider the role of Medicare in the retirement decision and present evidence on whether it, too, affects retirement choice.

Although they are reluctant to draw strong conclusions about the effect of Medicare eligibility on retirement behavior, the authors conclude that the results presented in the paper suggest that Medicare may indeed influence the retirement decisions of men. They find the following: (1) 55–69-year-old men with Medicare-eligible spouses have a higher retirement hazard than men without Medicare-eligible spouses. (2) The retirement hazard exhibits a pattern with respect to spouse's age that is consistent with what would be expected if Medicare were an important consideration in the retirement decision. It is inconsistent with a story that other factors more generally related to spouse's age, such as a spouse's health status, are strong determinants of retirement as the retirement hazard appears to be roughly constant after the spouse reaches age 65 rather than generally increasing. (3) The pattern of effects is approximately the same when the sample is confined to men whose wives have never worked. This latter group of men cannot be affected by any financial considerations inducing their wives to retire. Furthermore, having a nonworking spouse cannot differentially impact the retirement hazard with respect to spouse's age of this group because their wives have never worked. The most plausible explanation, the authors conclude, for the pattern of retirement effects exhibited by this latter group is the Medicare eligibility of their wives. Because the effects are similar for the whole population of men regardless of spouse's work history, it is likely that Medicare is also an important determinant of retirement for all men, Madrian and Beaulieu believe.

### Who Cares for the Elderly?

In her paper, "Caring for the Elderly: The Role of Adult Children," Kathleen McGarry considers the care received by the elderly from their children. She finds that only about 2 percent of children provide cash assistance to their parents and 10 percent provide other forms of help. Nonetheless, the parents who are most in "need" are most likely to receive help.

Much of the rising cost of health care for the elderly results from long-term care. In 1989, 77 percent of Medicaid funding directed toward those aged 65 or over was spent on nursing homes or home health care. Various strategies have been proposed to combat these growing expenditures. McGarry points to Governor Pataki of New York State, who has proposed drastic cuts in spending for home health care and housekeeping services, in an effort to balance the state's budget. On the other hand, President Clinton has proposed expanded home services as a substitute for more expensive nursing homes. To evaluate the potential impacts of such policies, McGarry argues, we need a clear understanding of the use and provision of home health care. Who are the preferred caregivers? How much substitution is there between formal and informal care? Will increasing the availability and affordability of home health care decrease more expensive nursing home admissions and therefore costs, or will the substitution away from unpaid care toward formal paid care be large enough to offset any savings?

McGarry uses the new survey of Asset and Health Dynamics among the Oldest Old to document the current use of home health care by the population aged 70 or over. She expands on the past work on this subject by exploring the role played by financial compensation from parents to children as a method of encouraging children to provide care, and by controlling more completely for factors such as income and wealth that may affect access to services.

She provides a descriptive analysis of the caregiving environment faced by disabled and impaired elderly. She finds that the strongest predictor of receiving care is need. Approximately two-thirds of those with a limitation receive assistance. Those who are not receiving care are on average better off in several dimensions, including having greater financial resources and better health. In many ways the type of caregiving relationship depends on the recipient's needs. Children, including non-coresident children, provide assistance with housekeeping tasks, while coresident individuals (spouses, children, and others) help with personal care needs.

On the other hand, McGarry finds that little assistance is provided by children. Only 10 percent of children provide time help to their parents (8.5 percent of non-coresident children). For some children, the provision of cash assistance would be a logical substitute. However, fewer than 2 percent of children are reported to have made cash transfers to their impaired parents. Perhaps more surprising, cash transfers are positively correlated with the provision of time assistance. Thus it is not the case that children who are unable to spend time helping a parent compensate with financial assistance. McGarry warns that the results should be interpreted with a degree of caution.

## **Measurement, Methodological, and Data Issues**

### **Measuring Poverty**

Several papers in this volume consider how we measure the economic status of the elderly and other methodological and data issues. Some of these concerns arise simply out of continuing interest in "how to do it right" or simply "how to do it at all." But other issues arise because of opportunities presented by new data, in particular the Health and Retirement Survey (HRS) and the survey of Asset and Health Dynamics among the Oldest Old (AHEAD), which will be widely used to study a host of aging issues in the future.

The paper by Angus Deaton and Christina Paxson, "Measuring Poverty among the Elderly," is in the first category. In the United States in 1992, there were four million elderly adults who were officially classified as poor. There were 31 million elderly in the United States in 1992, so the poverty rate was just under 13 percent. Children were much more likely to be poor than the elderly; 22 percent, or 15 million children, were poor. Deaton and Paxson address the questions of where such numbers come from and what, "if anything," they mean. The authors emphasize that the data used to make the official calcu-

lations do not tell us anything about individual poverty. Instead they provide information on the income of *families*, information that is used to construct a set of poverty counts about individuals. The transformation from families to individuals makes many assumptions, about the allocation of resources within the household, about the differential needs of children, adults, and the elderly, and about the extent of economies of scale. Given the data, the effect of these assumptions on the poverty count depends on living arrangements, on how people combine to form families, on whether people are married or cohabit, and on whether the elderly live by themselves or with other younger adults.

Deaton and Paxson examine how living arrangements affect poverty measurement in the United States. Conclusions about the living standards of the elderly are less determined by the data than by assumptions about who gets what and how poverty lines vary with household composition. Deaton and Paxson demonstrate the fact by calculating the sensitivity of poverty counts to key assumptions in their construction, they examine the basis for the assumptions, and they explore whether the empirical evidence has anything useful to contribute.

There are two problems in passing from family resources to individual welfare, one of which is the main topic of their paper. The first issue, about which they say little, is the intrahousehold allocation of resources. The measurement of individual poverty requires a rule for assigning welfare levels to individuals, based on the consumption or income level of the family or household in which they live. Any rule inevitably contains implicit assumptions about how resources are shared between different household members, for example, by age or sex.

The second problem is the one to which they give most attention. Even if resources are distributed equitably across household members, the size and age structure of households affects the welfare levels of their members. The same level of income or income per capita does not give the same standard of living to a large family as to a small one, or to an all-adult household compared with one with children. Larger households may be able to take advantage of “scale economies” when they share the consumption of public goods in the household, so that members of large households are likely to be better off than those of small households, even controlling for per capita income or total expenditure. Likewise, if children cost less than adults, then households with more children will require lower incomes to achieve a specified standard of living, given total household size. These issues are likely to be of particular importance when comparing poverty rates across age groups and are also likely to play out differently in countries with different living arrangements for elderly individuals. In the United States, where the elderly typically live in small households with few children, the treatment of child costs is unlikely to have large effects on the numbers of old people in poverty, although it can potentially have large effects on the poverty of the old relative to the young. Even when old people live alone, so that we can measure their resources from a

household survey, we cannot classify them as poor or nonpoor without a standard of comparison, a standard that cannot be derived without assessing the needs of other nonelderly members of the population. The treatment of scale economies is likely to be an important issue for both absolute and relative poverty rates of the elderly.

Deaton and Paxson first examine the sensitivity of poverty measures in the United States to assumptions about child costs and scale economies. They then estimate the size of scale economies and child costs in the United States, for which they have suitable consumption data. They begin by describing how official poverty measures are derived, and they present official poverty counts and rates for members of different age groups. They show that poverty measures for different age groups are quite sensitive to the treatment of scale economies and costs of children.

Based on their more formal analysis, they summarize: "But it is hard to escape the conclusion that expenditure patterns respond to family size in ways that are a good deal more complex than the simple story of public and private goods that we have considered in this paper. Constructing better models of this process remains a challenge for the future."

### Measuring the Quality of Health Care

For some time, the Health Care Financing Administration (HCFA) has published "standardized" mortality scores for each hospital in the country as an indicator of the quality of care. Similarly, patient mortality has been widely used in studies of the determinants of quality of care in hospitals. "The Covariance Structure of Mortality Rates in Hospitals" by Douglas Staiger raises serious questions about the meaningfulness of these numbers.

Staiger emphasizes that, despite the widespread acceptance of patient mortality as a proxy for quality of care, little is known about the statistical properties of this variable. A number of questions are of particular interest. First, how much useful information is there in such inherently noisy measures of quality; for example, how large is the signal-to-noise ratio? A related question is how persistent are these measures of quality of care: Are hospitals with unexpectedly high mortality rates this year likely to have unexpectedly high mortality rates next year, in five years, in ten years? Is the presumption of high persistence, commonly assumed by the public, consistent with the data? A third question is whether there is a correlation in patient mortality for patients with distinct diagnoses admitted to the same hospital? If so, then combining information from different types of patients may prove to be a useful way of summarizing common hospital-level components of quality of care. A final question of interest is what has happened to the cross-sectional distribution of patient mortality over time: for example, has there been convergence or divergence across hospitals? Have there been any noticeable changes in the variation of these measures in recent years as reimbursement and competitive pressures have grown?

Staiger uses annual data from 1974–87 for 492 large hospitals to investigate these questions. He analyzes data on standardized mortality rates for Medicare admissions in both specific diagnoses and in aggregate. In addition to presenting simple descriptive evidence on the distribution of the mortality measures, he estimates covariance structures using general method of moment methods, which provide a simple and powerful description of the basic features of the data.

Staiger concludes that the empirical results presented in his paper have a number of implications. Perhaps the key one is this: “For those using these mortality variables as proxies for quality of care, the statistical properties of mortality should raise some concern. The amount of noise in these measures is on the order of 80 to 90 percent of the total variance.” In thinking more generally about the process that determines quality of care in a hospital, the model may give some insight. An obvious interpretation of the “three factor” model used in the analysis is one in which the hospital effect represents general infrastructure such as the nursing staff, physical plant, or skill of the medical staff. These characteristics might be expected to be fairly permanent and in fact may represent what one often thinks of when thinking of a top-notch hospital. In contrast, the diagnosis-specific component could be thought of as technological innovations specific to that diagnosis. Casual observation suggests that AMI is a diagnosis that has had substantial technological innovation over the past 20 years, and this is consistent with the fact that the variance of the diagnosis-specific factor is much larger in AMI than in congestive heart failure, for example. On the other hand, such innovations tend to diffuse to other hospitals fairly rapidly, and so it is not surprising that this diagnosis-specific component does not persist much beyond five years.

Of course, there are alternative interpretations of the results. For example, the hospital component may reflect permanent differences in the population that each hospital serves, which are not captured by the adjustment for expected mortality. Distinguishing the quality-of-care interpretation from the case-mix interpretation is an important topic of future research, Staiger says.

Finally, the results suggest that there have been important changes in the distribution of patient mortality across hospitals between the mid-1970s and the 1980s. The reasons for this shift, and the corresponding change in the auto-covariance structure of mortality, are unknown. It remains to be seen whether a simple extension of the models considered here can explain this anomaly. One possible explanation is that important technology shocks always begin with flagship hospitals and then diffuse through the remainder of the population. Thus mortality in “innovative” years might be much more correlated than in average years.

### Measuring Wealth and Using Subjective Probabilities

One of the innovations in the new HRS and AHEAD surveys is the use of “bracketing” to obtain information about the financial resources of the elderly.

If a respondent does not give an answer when asked, for example, how much money is in the bank, then the interviewer asks whether it is less than some amount (like \$10,000) or between two amounts (like \$10,000 and \$50,000). In "Household Wealth of the Elderly under Alternative Imputation Procedures," Hilary Hoynes, Michael Hurd, and Harish Chand conclude that the use of brackets, together with the use of other individual information, can substantially improve measurement of household wealth.

At retirement the economic resources of the elderly can include housing equity, nonhousing wealth, social security benefits, and pension rights. Housing and social security are the most important resources because a substantial fraction reach retirement with little saving and no claim to a pension. In many surveys of assets the rate of missing data in individual asset items is high, about 30 to 40 percent among those with the asset. This raises the issues of the reliability of wealth measures because respondents who refuse or are unable to give a value to an asset item may not be representative of the population.

Hoynes, Hurd, and Chand use the AHEAD survey to examine the distribution of wealth among the elderly. Because of the data collection methods in the survey, they are able to reduce the rate of missing data on wealth and, they hope, obtain better estimates of the distribution of wealth than are available with other data sources. They devote considerable effort to the measurement of each of the components of wealth. Their methods preserve the relationships among measures of economic status to a greater extent than previous methods, and this, they believe, should increase both the mean and the skewness of the wealth distribution. To illustrate the effects of their methods, they compare estimates of the distribution of wealth using their preferred imputation method with estimates based on other commonly used methods.

They conclude that the most important AHEAD innovation is the extensive use of bracketing: the brackets reduce substantially the rate of missing data and, most important for studying individual behavior, provide individual-level information that cannot be obtained from imputation based solely on personal characteristics. In addition, the bracketing changes averages, which is important for assessing the economic status of the elderly.

The use of other personal information also helped impute some asset levels. For example, the covariates reduced housing wealth considerably among the "incompletely bracketed" respondents. While the authors believe the use of covariates is a considerable improvement, they conclude that the use of brackets with small samples needs further study.

Another innovation in the new HRS and AHEAD surveys is collection of information on individual expectations about future events. Respondents are asked how likely it is that they will work past age 62, for example; how likely it is they will live past age 80; and so forth. The responses to such questions have become known as subjective probabilities. In "Subjective Survival Curves and Life Cycle Behavior," Michael Hurd, Daniel McFadden, and Li Gan consider the use of individual subjective data on survival in economic models. Although these data accord well with external data on survival, the authors

conclude that the concentration of survey responses at “focal” points—such as 0.5—must be addressed if the data are to be generally used in models of economic behavior.

Hurd et al. point out that many economic models are based on forward-looking behavior. Although it is often said that “expectations” about future events are important in these models, more precisely it is the probability distributions of future events that enter the models. For example, consumption and saving decisions of an individual are thought to depend on what he or she thinks about future interest rates, the likelihood of dying, and the risk of substantial future medical expenditures. According to economic theories, decision makers have probability distributions about these and other events, and they use them to make decisions about saving. This implies that data on these distributions should be used in estimation. The authors note, however, that in few cases are data available that may plausibly be assumed to approximate those contemplated in the models. The life cycle model of consumption in which mortality risk helps determine saving is the leading example.

The authors recognize that individual survival probabilities can be obtained by using individual attributes to adjust population life tables. But, they say, individuals are likely to have subjective probability distributions that partly are related to observable variables but partly are not. It is these subjective probability distributions that should enter life cycle models of saving, so any models that rely on fitted probability distributions have intrinsic limitations.

AHEAD has eight measures of subjective probabilities. The authors find that these measures have informational content but that they cannot be used without modification as right-hand variables in a model of decision making because of “cognition” and observation error. They propose and estimate a model of cognition error and then apply the model to life tables and to data from AHEAD to produce usable subjective probabilities of survival.

They find that stated probabilities are distorted by focal points. The evidence from the model is that there is in addition reporting error in nonfocal responses but that this error is small relative to variation in individual expectations. They conclude that nonfocal responses can be used with relatively minor adjustments to predict personal survival curves. More substantial adjustments are required to predict survival curves for focal respondents, however. Their preliminary analysis of the relationship between survival probabilities and saving behavior suggests that there is a weak correlation but that there remains considerable unexplained variation in saving rates. Because medical expenditures or other factors may influence current saving rates, they cannot draw any conclusions about the direction of causality between survival probabilities and economic decisions regarding wealth and savings.

### Specific Disease and Survival

Jayanta Bhattacharya, Alan Garber, and Thomas MaCurdy also address questions of survival, but from a very different perspective. In their paper, “Cause-Specific Mortality among Medicare Enrollees,” they explore the use of

Medicare insurance claims data to estimate survival curves. They believe that their methods can be used, for example, to provide survival probabilities, and thus future Medicare expenditures, for the care of persons with specific diagnoses.

To motivate their analysis, the authors note that attempts to forecast health expenditures, to determine costs of specific illnesses, and to assess the long-term impact of programs designed to prevent or relieve specific diseases all require accurate estimates of mortality rates. Many such efforts build on information about the cause and timing of death for people who have certain diseases. However, the empirical basis for making accurate projections of cause-specific mortality, particularly for well-defined demographic and clinical subgroups, is often weak.

The standard life table framework offers a simple and powerful method for drawing inferences about the distribution of survival. Yet seldom have the data proved capable of supporting detailed studies of mortality by cause for well-defined populations. Standard U.S. life tables, based on birth records and death certificate data, with cause-of-death data, are published every several years by the National Center for Health Statistics. Life tables compiled by age, race, and sex are published annually. Although these sources offer useful information about mortality trends by demographic group, they provide little information about the survival distribution pertinent to people with specific health conditions and risk profiles. Thus it is difficult to obtain, for example, a life table applicable to 70-year-old men who are discharged from a hospital with a diagnosis of myocardial infarction. Small clinical studies and registries often provide information of this kind, but they usually are limited either by the selection criteria used to define the study population or by small sample sizes. They are not sufficiently comprehensive to cover a wide range of conditions, or to analyze a nationally representative sample.

Bhattacharya et al. describe the first steps toward developing such life tables. They lay out an approach to estimating survival patterns among the elderly that is based on longitudinal analysis of data from Medicare eligibility and claims files. These files offer a nationally representative sample of the elderly. Information about the cause of death, derived from hospital discharge files, allows them to link additional information about the terminal hospitalization and provides the opportunity to obtain confirmatory data that are not routinely available from death certificate information. They develop a flexible functional form model to relate annual mortality rates to a set of individual characteristics.

The longitudinal analysis they describe, which focuses on cause of death, can be a building block for studies that address a number of additional issues. For example, it can be extended to estimate future Medicare expenditures for the care of individuals who carry specific diagnoses. It can provide information about the expected pattern of expenditures for persons with a given set of characteristics, including not only age and gender, but also race, comorbidities,

and prior hospital utilization. Similarly, such analysis can be used to identify populations who should be targeted for either preventive interventions or the identification and treatment of diseases. Finally, it can inform efforts to determine whether otherwise identical patients who receive different treatments have different outcomes.