

# NBER *Reporter*

NATIONAL BUREAU OF ECONOMIC RESEARCH

SUMMER 1996

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## Program Report

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### The Economics of Aging

David A. Wise\*

The central goal of the NBER's Program on the Economics of Aging is to develop a better understanding of the issues that are of particular importance to individuals as they age and to a society that is composed increasingly of older people. Over the past several years, we have focused on three areas: 1) the financial well-being of the elderly, with special emphasis on saving for retirement; 2) the labor force participation of older Americans, with substantial analysis of the role of employer-provided pension plans and Social Security provisions in encouraging early retirement; and 3) the role of housing, both as a potential source of financial support after retirement and in the determination of living arrangements as people age. More recently, we have sought to understand the reasons for the rapid growth in the cost of medical care, as well as the benefits of that care. (The economics of aging program and the health care program have been coordinated closely under the "Aging and Health Care Programs" that I oversee. Details of work in the health care program were reported by Alan M. Garber in the Winter 1995/6 issue of the *Reporter*.)

The NBER's Program on the Economics of Aging began in 1986. Since that time, it has included a large number of research projects, many of them integrated as part of coordinated investigations. Indeed, the program has developed primarily around these large coordinated research projects that are structured to address simultaneously several interrelated issues in the economics of aging. Central infrastructure for the program now is provided through a National Institute on Aging (NIA) "Center for Aging and Health Research" at the NBER. The Center has been instrumental in maintaining and expanding data files that support a broad array of ongoing research projects. There has been a particular focus on acquiring health care data that are used to support health care research within our program.

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# NBER Reporter

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The Center also promotes research abroad on the economics of aging and facilitates coordinated international projects. One ongoing project on international social security, coordinated by Jonathan Gruber and me, evaluates the effects of government-directed social security programs around the world on the labor force participation of older workers. The Center supports an emerging project, coordinated by David E. Bloom, on the implications of the government retirement program in South Africa. Further, we have an ongoing joint project with the Japan Center for Economic Research, which has focused on issues that are of common concern in Japan and the United States. Individual projects under this program have directed attention to saving and labor force issues in Canada, Germany, Taiwan, and several other countries.

Much effort also has been directed to attracting young researchers to the economics of aging. To this end, our NIA Fellowship Program each year provides fellowships to two or three graduate students who are engaging in research on the economics of aging. In addition, it provides two or three postdoctoral fellowships each year to young professors, enabling them to spend a year at the NBER to do research on issues in the economics of aging and health care. The postdoctoral fellows in the past two years were: Dora L. Costa, MIT; Hilary W. Hoynes, University of California, Berkeley; Brigitte C. Madrian, University of Chicago; Kathleen M. McGarry, University of California, Los Angeles; David O. Meltzer, University of Chicago; and Douglas O. Staiger, Harvard. The effort to attract young researchers to our program also is reflected in four recent NIH First Independent Research Support and Transition (FIRST) awards granted to young members of the economics of

aging research group: David M. Cutler, Mark B. McClellan, Gruber, and Madrian.

Much of our recent research on the health care of the aged is based on unique and very extensive Medicare claims files, and on employer-provided medical insurance claims files that have been amassed under the infrastructure of the aging program, including the Center for Aging and Health Research. McClellan has played the key role in developing the Medicare files, and he and I have put together the employer files. Current and future research also will rely heavily on the new Health and Retirement Survey (HRS) and the new Survey of Asset and Health Dynamics Among the Oldest Old (AHEAD). These longitudinal surveys are sponsored by the NIA, and are structured to support research on individuals over age 50, as they age through retirement and other life transitions. As new waves of these surveys are collected every two years, these data will provide a comprehensive picture of issues affecting the health and well-being of older Americans, and will be an important source of information for our research. Although research under our program has been funded through a wide range of sources, we have been aided especially by the broad support we received from the NIA.

Participants in the aging program have written over 200 papers. Some of these appear in a series of books published by the University of Chicago Press, including: *The Economics of Aging* (1989), *Issues in the Economics of Aging* (1990), *Topics in the Economics of Aging* (1992), *Studies in the Economics of Aging* (1994), *Aging in the United States and Japan: Economic Trends* (1994), *Advances in the Economics of Aging* (1996), and *The Economic Effects of Aging in the United States and Japan* (forth-

coming). I will now discuss a sample of our work.

## **Pension Plans, Health Insurance, and the Labor Market**

The American population is aging rapidly, and individuals are living longer. Yet Americans are saving little, and older workers are leaving the labor force at younger and younger ages. The prospect is for a shrinking proportion of labor force participants supporting a growing fraction of retired persons. The trend is unlikely to be sustainable and will have to be addressed if the federal budget is to be brought into balance. It now seems clear that much of the decline in labor force participation can be attributed to the provisions of employer-provided pension plans, as well as to the provisions of Social Security. The goal of pension plans is to provide a means of support in retirement. Indeed, the plans have allowed employees to retire at earlier ages. But pension plans not only provide a means of support in retirement. Plan provisions that determine how prospective benefits increase or decrease with age (the "accrual" of benefits) can provide enormous incentives to work until a certain age and to take early retirement thereafter. As the cost of health insurance has increased, the availability of retiree health insurance also may have played an important role in retirement decisions.

### *Employer-Provided Pension Plans and Early Retirement*

A series of studies that I did with Robin L. Lumsdaine and James H. Stock demonstrated the dramatic effect of defined-benefit pension plan provisions on retirement behavior.

The accrual of benefits under these plans typically provides large financial incentives to continue working at some ages and to retire at other ages. These incentives generally encourage early retirement and penalize continuation in the labor force at older ages. For example, firm pension plans commonly provide a large increase in benefits at the early retirement age, which is often 55. Although employees become eligible for larger pension payments by continuing to work, the increase is rarely large enough to compensate for the delay in receiving benefits. This induces substantially younger retirement than would occur without the plans. The substantial effect of pension plan incentives on retirement behavior has been confirmed with data from several companies, as well as option value and dynamic programming models of retirement.<sup>1</sup> This series of studies also has shown that among workers covered by both Social Security and a typical employer pension plan, the effect of pension plan provisions on retirement age is far more significant than the effect of Social Security provisions. Indeed, the retirement of most employees covered by typical defined-benefit pension plans would be unaffected by planned changes in Social Security provisions, because a large fraction of these employees already have retired by the age at which those provisions become important. Those without employer plans would be affected; an increase in the Social Security early retirement age would have the greatest effect on employees without firm pension plans.

A study that I did with John Ainsink<sup>2</sup> examines the effects of compensation and pension arrangements on the decisions of Air Force pilots to retire from the military.

The option value model of retirement used in this study predicts retirement rates far more accurately than the "annualized cost of leaving model" that has been used by the military. For example, to encourage people to leave the military, the Air Force has instituted at least two incentive programs since 1992. Fewer officers than expected applied to either program. Applying the option value model, however, Ausink and I find that the effects of temporary annual retirement bonuses, such as Aviator Continuation Pay, are small. Indeed, the bonus amounts must be extremely large to induce departure rates that come close to Air Force objectives.

An apparent anomaly in the pattern of retirement ages is the high retirement rate at age 65. Lumsdaine, Stock, and P<sup>3</sup> conclude that the high rate at this age cannot be explained entirely by the financial incentives inherent in pension plan and Social Security provisions. Nor can it be explained entirely by the availability of Medicare at age 65. We conclude that much of the high rate at age 65 must be attributed to a Social Security "age 65 normal retirement effect." To the extent that this is true, it implies that changing the normal retirement age could have effects on departure from the labor force, independent of changes in the financial incentives of the provisions.

New information that has been collected for the first time through the Health and Retirement Survey confirms the effects of employer-provided pension plans. The survey asks respondents a series of questions about the "subjective probabilities" of various events. One example is the likelihood that a person will work past age 62. Michael D. Hurd and McGarry find

that persons without defined-benefit pension plans are much more likely than those with such plans to say that they expect to work past age 62.<sup>4</sup> Controlling for pension plan and health status, I find in addition that persons without retiree health insurance are more likely to say that they expect to work past age 62.<sup>5</sup>

Ongoing research is based primarily on data from the new Health and Retirement Survey. This resource will enable us to analyze much more varied retirement plan provisions than those from individual firm data, and to assess the joint effects of other worker characteristics, such as their health benefits, income and wealth from other sources, and health status.

### *Health Insurance and Labor Force Participation*

In a series of papers, Gruber and Madrian considered the extent to which the availability of retiree health insurance influences retirement. Although the vast majority of working individuals aged 55-64 receive health insurance coverage through their employers, not all employers offer retiree health insurance. Employees who retire before age 65 without retiree health insurance face the prospect of going without insurance until they become eligible for Medicare at age 65, or of paying large premiums for individually purchased insurance. Thus persons without insurance may be less likely to retire than those who are covered by retiree health insurance. One study by Gruber and Madrian finds that state and federal continuation-of-coverage mandates (laws allowing individuals to continue purchasing employer health insurance for a specified number of months after

leaving the firm) lead to higher retirement rates.<sup>6</sup> A study by Madrian compares the retirement behavior of men whose spouses are eligible for Medicare versus those who are not eligible.<sup>7</sup> The results show that 55-to-69-year-old men with eligible spouses are much more likely to retire than those whose spouses are not eligible for Medicare. The implication is that the availability of health insurance for the spouse makes it less costly for the man to retire.

Another study by Madrian finds that employees at companies that provide retiree health insurance retire 5-16 months earlier than employees at companies without such insurance.<sup>8</sup> This series of studies suggests a significant relationship between health insurance and retirement that is being evaluated further in ongoing research.

In a series of studies, Gruber and Madrian also consider the influence of health insurance on job mobility. The prospect that health insurance from a new employer may not continue existing-employer coverage, or may not cover pre-existing conditions, decreases voluntary job turnover by about one-fourth, from 16 percent to 12 percent per year.<sup>9</sup> Another study finds that continuation-of-coverage mandates increase job mobility.<sup>10</sup> One year of continuation benefits is associated with a 5 percent increase in mobility for those with health insurance. A third study confirms the effect of continuation of coverage, not only in increasing job mobility, but also in increasing the number of individuals who experience periods without a job.<sup>11</sup> This study also finds that continuation mandates increase the total amount of time spent unemployed.

In a related paper, Cutler and Madrian consider the effect of rising health insurance costs on hours

worked.<sup>12</sup> Specifically, they evaluate the extent to which employers respond to higher health insurance costs by hiring fewer workers who work for more hours, thereby economizing on the "fixed cost" of health insurance per worker. They estimate that the increasing cost of health insurance between 1980 and 1992 led to an average increase of one to two hours worked per worker per week.

## Retirement Saving and Asset Accumulation

It often is presumed that support in retirement is provided by three legs: Social Security, employer-provided pensions, and personal saving. For most Americans, however, the first leg is very tall, the second leg is shorter, and the third leg barely clears the ground. Research on the financial status of older Americans that I conducted with James M. Poterba and Steven F. Venti finds that the median level of personal financial assets of those on the verge of retirement was only about \$7000 in 1991. However, contributions to personal retirement accounts have expanded very rapidly since the early 1980s when they were first introduced. Contributions to IRAs reached a peak of \$38 billion in 1985, and were made by 16 million individuals. Contributions fell by over 75 percent after the tax advantages were limited by the Tax Reform Act of 1986, and higher-income families virtually stopped contributing. Contributions to 401(k) plans, however, continued to grow, from zero in the early 1980s to over \$60 billion today, with over 20 million participants. Now, contributions to targeted retirement saving accounts exceed contributions to conventional employer-provided pension plans.

Thus this form of individual retirement saving is likely to have an increasingly important role in the support of future retirees.

### *The Saving Effect of IRA and 401(k) Programs*

In a series of papers, Venti, Poterba, and I, and Venti and I have considered whether IRAs and 401(k) programs have added to personal saving. These studies find that IRA and 401(k) plans have added substantially to the net saving of contributors. Indeed, we find very little substitution between contributions to these accounts and saving in other forms. In a recent paper with Poterba and Venti, I show that as assets in these accounts grew between the early 1980s and the early 1990s, there was essentially no change in the other financial assets of contributors.<sup>13</sup> We also find that, after controlling for income and other personal attributes, persons eligible for a 401(k) plan have accumulated substantially more in financial asset saving than those who are not eligible for such a plan, even though at the outset of the 401(k) program the two groups had essentially the same level of assets.

In a forthcoming paper<sup>14</sup> that possibly may provide the best single evidence on the saving effect of IRA and 401(k) plans, Venti and I find that younger cohorts who reached a given age in a later year, and thus had more years to contribute to these plans, had substantially more in financial assets than older cohorts. The difference was explained entirely by contributions to these special saving programs. We found no differences between cohorts in non-IRA-401(k) saving. Venti and I conclude that the youngest cohorts in the analysis will have accumulated much more in person-

al financial assets by the time they retire than cohorts that are retiring now. These and the results of several other methods for inferring the effects of these programs are summarized in my research summary that appeared in the Fall 1995 issue of the *NBER Reporter*.

In an extensive compilation of the key evidence on IRA and 401(k) saving, Poterba, Venti, and I<sup>15</sup> provide a detailed summary of a series of analyses. This paper involves the method used to control for saver heterogeneity, and also attempts to reconcile the results with the results of analyses by other researchers, which in some cases come to different conclusions. In addition, we present new results on the potential trade-off between IRA and 401(k) assets and housing equity, concluding that there is little systematic relationship between housing equity and saving in the special retirement saving accounts. We also present a detailed critique of the often-cited paper by Gale and Scholz, which concluded that IRA contributions were offset completely by a reduction in other saving. Based on our analysis of the data used by Gale and Scholz, including calculations based on a replication of their model, we conclude that their results are inconsistent with the raw data and cannot be supported by their formal model.

Extending this line of research to include international comparisons, Venti and I are studying the saving effect of Registered Retirement Saving Plans (RRSPs) in Canada.<sup>16</sup> Like the IRA and 401(k) programs, the RRSP program is structured so that individuals deduct plan contributions from income for tax purposes. Interest accrues tax-free until withdrawal, when taxes are paid. RRSPs were first introduced in Canada in 1957.

They became a prominent form of saving in the early 1970s, and in 1992 accounted for about one-third of personal saving. Aggregate data on savings rates suggest that the divergence in previously similar Canadian and U.S. personal saving rates—when Canada's saving rate grew much faster than the U.S. saving rate—coincided with the growth of the RRSP program beginning in the early 1970s. Based primarily on cohort analysis, Venti and I conclude that RRSPs contributed substantially to personal saving in Canada, and for the most part did not substitute for other forms of saving.

A study by Leslie E. Papke, Mitchell Peterson, and Poterba<sup>17</sup> reports the findings from a small survey of firms that provide 401(k) plans for their employees. The results suggest that few 401(k) plans replaced preexisting defined-benefit pension plans, although a substantial fraction replaced previous defined-contribution thrift and profit-sharing plans. The survey results also provide new evidence on patterns of 401(k) participation. The authors find significant persistence in firm-level participation rates from one year to the next, which supports the view that 401(k) participants are not making marginal decisions about whether to contribute to the plan in a given month, or even year, but rather make long-term commitments to participate in these plans.

## Other Determinants of Financial Status

### *Housing and Other Saving*

Housing equity is the major asset of a large fraction of Americans. Rapid increases in housing values

over the past two decades in particular have motivated consideration of the possible trade-off between housing equity and financial asset saving. And, demographic trends raise questions about the future value of home equity itself.

Daniel L. McFadden finds that future demographic changes in the United States will cause a reduction in the real value of housing.<sup>18</sup> These projected declines in the value of homes that will affect the financial status of future retirees contrast with the large capital gains earned by the current generation of elderly homeowners. The real inflation-adjusted rate of return on housing investments, which has been substantial for past retirees, is projected to become negative in the future. A related study by Hoynes and McFadden concludes that there is very little trade-off between housing equity and financial asset saving.<sup>19</sup> In particular, they conclude that no adjustment in nonhousing assets is made in response to housing price changes, which could have important implications for the welfare of the elderly in the future.

### *Social Security, SSI, Transfers*

Although the financial status of the elderly relative to younger persons has increased substantially in the past two or three decades, some elderly are poor. The limited poverty of the elderly is concentrated among widows. In earlier work, Hurd and I found that many widows who were not poor before the death of a spouse became poor after the death. Much of the reduction in income that places widows below the poverty level is attributable to the reduction in Social Security benefits at the spouse's

death. Thus we<sup>20</sup> have explored the effect of changes in Social Security provisions on the financial status of widows. We find that poverty rates of widows could be reduced materially by an increase in survivorship benefits funded by a reduction in the benefits of couples. For example, a 20 percent increase in survivorship benefits would have reduced the 1989 poverty rate of widows from about 39 to about 20 percent. The poverty rate of couples would have increased from 6 to 8 percent under this scenario.

McGarry has considered participation in the Supplemental Security Income Program (SSI).<sup>21</sup> Using a sample from the Survey of Income and Program Participation, McGarry finds that only 56 percent of those determined to be eligible for SSI are receiving benefits presently, and that participation is determined primarily by the financial situation of the eligible individuals. Although all those eligible for SSI are poor, those with little in the way of other resources are significantly more likely to participate. This finding may be at variance with the widespread beliefs that eligible individuals are discouraged from participation by the difficulty of the application process, or that many are uninformed about the program.

Intergenerational transfers also can play a role not only in the financial status of the elderly, but in the financial status of their aging children as well. The incidence and determinants of intergenerational transfers have been considered in two studies<sup>22</sup> by McGarry and Robert Scheoni, using data from the Health and Retirement Survey and the Asset and Health Dynamics Survey. They find that intrafamily transfers from parents to children, and from adult children to elderly

parents, are directed disproportionately to the less-well-off families. These results hold for both the incidence of transfers and for the amounts. For example, within a given year, adult children in the lowest income category were 6 percentage points more likely to receive a financial transfer from their parents. On average they received over \$300 more than siblings in the highest income category.

### *Aging and Income Inequality*

Angus S. Deaton and Christina H. Paxson consider the relationship between the aging of the population and the distribution of income and assets.<sup>23</sup> Because the distribution of income and wealth is more unequal at older than at younger ages, the aging of the population appears to result in a more unequal distribution of income in the population as a whole. In some countries, the distributional consequences of the aging of the population may lead to more individuals at very low income levels than now.

### *Differential Mortality and Wealth*

A series of studies consider the implications of the higher mortality rates of people with fewer financial resources. Two studies have been completed recently on differential mortality and wealth accumulation. One by Orazio Attanasio and Hoynes<sup>24</sup> finds that mortality rates among the lowest wealth quartile are about three times as high as mortality among the highest quartile for households at age 65; this disparity increases with age. One implication of this result relates to life-cycle saving patterns. Because wealthier individuals tend to live longer, the average wealth level at

increasing ages overstates the life-cycle wealth pattern at older ages. The implication is that there is substantially more dissaving among the elderly than has been estimated using unadjusted wealth-age profiles.

A related study by Hoynes, Hurd, and Harish Chand<sup>25</sup> incorporates differential mortality into estimates of Social Security wealth. Because wealthier individuals live longer, they receive Social Security benefits over a longer period. Thus their estimated Social Security wealth (the discounted value of expected future benefits) is higher, not only because their annual Social Security income is higher, but also because they are likely to receive it for more years. Thus accounting for differential mortality leads to a more unequal distribution of Social Security wealth than is observed assuming average mortality for all recipients. Hoynes, Hurd, and McFadden are pursuing further analysis aimed at determining the explanation for the strong relationship between mortality and financial resources.

### **The Way We Analyze Saving and Financial Status**

Much of the analysis of saving behavior is based on the life-cycle model of saving and consumption, and concentrates on the rate of return as the major determinant of saving. Based on our analysis of the saving effect of IRA and 401(k) plans, Poterba, Venti, and I have argued that traditional explanations of saving leave much of actual saving behavior unexplained. Indeed, many investigators have concluded that data on saving before and after retirement is inconsistent with typical theories of life-cycle saving.

Using cohort data, Deaton and

Paxson find that in many countries it is typical for people to continue to save after retirement.<sup>26</sup> This result is contrary to the traditional "life-cycle" explanation of saving, in which people save during their working years to support themselves by drawing down assets after retirement.

Hoynes, Hurd, and McFadden are studying the determinants of saving, with a focus on the effects of subjective information on health, mortality, and other beliefs (obtained in the new Health and Retirement Survey). They are considering how individual subjective beliefs about the future influence saving decisions today. For example, to what extent do people who expect to live longer save more to prepare for a longer life? New data in the Health and Retirement Survey include several innovative measures of subjective beliefs about future longevity and future labor force decisions; these will be used extensively in ongoing work on this project.

### *How Poverty Is Measured*

Much of the evaluation of financial status in the United States is summarized through measures of poverty. Poverty measurement is complicated by the fact that individuals live in households of differing sizes and age compositions. For example, elderly people tend to live in homes with fewer family members than nonelderly individuals, which may mean that they cannot take advantage of household economies of scale to the same extent as younger individuals. Deaton and Paxson<sup>27</sup> have explored the sensitivity of poverty counts to variations in assumptions about child costs and economies of scale. Using data from the United States and

six large states in India, they find that poverty counts are very sensitive to the assumptions inherent in the measures that are used.

## Medical Care and Cost Increases

Rising U.S. health care costs have been the source of public concern and public debate for some time. The rapid aging of the American population will place increasing pressure on the health care system and its financing. Research in this program is intended to identify the sources of cost increases, to understand the effects of intensive treatments—which may be the central cause of cost growth over the past decade—and to analyze the effects of potential cost containment measures. Much of this work is organized under a project on health care cost containment.

### *The United States and Other Countries*

A comparative study, conducted by Cutler, finds that the cost of health care in the United States rose more rapidly than in other countries with no corresponding increase in relative longevity.<sup>28</sup> Part of the rapid growth in U.S. health care costs in recent decades, relative to other OECD countries, results from increases in income. However, after adjusting for differences in income across countries, Cutler finds that the United States still spends substantially more on health care than would be expected. While the income-adjusted growth in U.S. medical expenditures was comparable to that of other countries in the 1960s and 1970s, it grew at a much faster rate than other countries in the 1980s. This relative increase in spending

was not associated with corresponding increases in longevity, however.

### *Technology and the Source of Cost Increases*

Much of the research in this program suggests that cost increases are attributable primarily to the use of more expensive technologies, rather than to the higher cost of performing given procedures. Cutler and McClellan conducted a detailed study of cost increases for the treatment of heart attack patients.<sup>29</sup> Between 1984 and 1991, real spending per heart attack patient rose by 4 percent annually. By decomposing the cost and frequency of alternative heart attack treatments over time, they find that essentially all of the expenditure growth resulted from more frequent use of intensive cardiac technologies—catheterization, bypass surgery, and angioplasty. Indeed the prices paid for any given treatment generally declined over this period, while the number of patients treated intensively increased from 10 percent to over 40 percent.

McClellan also has looked at the effect of Medicare's Prospective Payment System (PPS) on treatment decisions and costs. He demonstrates how the current provisions of the PPS system encourage more frequent use of some intensive medical procedures.<sup>30</sup> The conventional understanding of PPS is that hospitals are reimbursed a fixed amount per patient, based on the patient's diagnosis, or DRG. This series of studies notes that some DRGs base the amount of reimbursement on the medical treatment provided, rather than on the diagnosis alone. Hospitals perform many more of the intensive treatments that are explicitly reimbursed as DRGs, while intensity and ad-

missions have remained constant or fallen for most diseases that are reimbursed by diagnosis.

Cutler and McClellan also have addressed the determinants of technological change in medical care.<sup>31</sup> Again, this effort has focused to date on heart attack treatments, but will be extended to a range of other diagnoses. Initial work has considered five factors that may influence the adoption of new technologies at hospitals: the insurance environment in which it is reimbursed; public policy regulating new technology; malpractice concerns; competitive or cooperative interactions among providers; and demographic composition. The initial work suggests that insurance patterns and provider interactions have the largest effect on technology diffusion, at least in the treatment of heart attack patients. More generous insurance is associated with more rapid technology diffusion; when HMO enrollment increases, technology diffusion occurs more slowly. In addition to extending the analysis of technology diffusion to a broader range of health care technologies, an important goal of future work in this area is to evaluate how the availability of technology at hospitals relates to individuals' access to new technologies.

Results that have not yet been fully reconciled with these findings pertain to the patterns of Medicare cost increases. Based on a decomposition of Medicare *hospital* expenditure growth by cohort, gender, race, and percentile in the expenditure distribution, Garber and Thomas E. MaCurdy find a broadly similar rate of increase in Medicare expenditures at all levels.<sup>32</sup> The increase in the highest 10 percent of expenditures, for example, has been about the same as the increase for the lowest 50 percent.



However, when differentiating between expenditures, they find much more rapid growth in surgical expenditures. More recent results based on the same methodology suggest more rapid growth in hospital costs among the very highest-cost beneficiaries.

### *The Effects of Intensive Treatment*

Intensive medical treatments are increasingly common, but the effects of these treatments on health care outcomes is not always well understood. McClellan considers the effectiveness of more technologically intensive procedures in the treatment of Medicare patients. He has developed an instrumental variables method that effectively randomizes individual patients to different probabilities of receiving a particular procedure, based on geographical proximity to a hospital that performs those procedures. To date, these methods have been applied most extensively in analyzing heart attack patients,<sup>33</sup> and to the effect of intensive treatment (cardiac catheterization, angioplasty, and bypass surgery) on mortality of patients for whom the benefits of intensive treatment are least conclusive. While intensive treatments are clearly effective in some patients, initial results of this work suggest that the use of invasive cardiac procedures could be reduced by at least one-fourth with no consequences for mortality and over \$300 million per year in savings in hospital costs alone. Similar methods currently are being applied to analyze the effectiveness of alternative treatment of ischemic heart disease, ventricular arrhythmias, and major cancers; and to other long-term outcomes besides mortality (such as the subsequent

development of important medical complications).

### *Defensive Treatment*

Cost increase also may be related to the prevalence of malpractice suits. Daniel Kessler and McClellan have examined the overuse of "defensive" medical practices.<sup>34</sup> They consider whether physicians respond to the threat of malpractice lawsuits by being too careful, that is, by administering precautionary treatments with minimal expected benefit because they fear legal liability. They find that malpractice reforms that directly reduce providers' liability lead to reductions of 5 to 9 percent of medical expenditures without substantial effects on medical complications or mortality.

### *Firm Health Insurance Plans*

A comprehensive research effort is focused on the variation in expenditures in firm health insurance plans, and on how differences in plan provisions influence treatment decisions and costs. Early results that McClellan and I reported consider how health care dollars are spent in one large firm.<sup>35</sup> This initial work suggests large differences in health care spending that seems to be related to plan provisions. For example, in this firm, substance abuse and mental health disorders account for 40 to 60 percent of total health care costs for younger employees. (In other firms, the cost for substance abuse and mental health is much lower, and expenditures related to other diagnoses are much different.) This initial work also suggests substantial persistence in individual health care expenditures from one year to the next. For example, the most expen-

sive 20 percent of plan enrollees in 1990 accounted for over 85 percent of health care costs in 1990, and still accounted for almost 50 percent of health care costs in 1992.

Matthew Eichner, McClellan, and I explore the implications of individual persistence in expenditures for the feasibility of individual health savings accounts.<sup>36</sup> We consider the implications of persistence for a hypothetical health insurance plan composed of a catastrophic health insurance plan established in conjunction with individual health accounts (IHAs). Under this plan, the employer establishes both a high-deductible health insurance plan and an IHA. Employee health care costs below the deductible then are paid out of the IHA; costs above the deductible are paid by the insurance plan. Assets remaining in the account when the employee retires are available for other purposes. Although attractive because it helps to solve the "moral hazard" problem associated with conventional insurance plans, the scheme might be considered infeasible if medical expenditures over a working life are so persistent that certain individuals accumulate little in the IHA while others accumulate a great deal. Although such a plan would produce a range of individual balances at retirement, the results using the illustrative plan design suggest that approximately 80 percent of plan enrollees would retain over 50 percent of their contributions. Only about 5 percent would retain less than 20 percent of their contributions. Thus the authors conclude that persistence in medical expenditures does not present a roadblock to gaining the potential advantages of individual health accounts.

Using data from more than 100 health insurance plans in over 40

firms, with a wide range of plan provisions, ongoing work on this project is evaluating the influence of plan provisions on treatment decisions and costs. Because many employers offer more than one health insurance plan, some of the difference in health care costs across plans can be attributed to self-selection: individuals choosing more generous plans when they expect to have higher health care costs. Some of the difference in cost across plans also can be attributed to more generous plans inducing enrollees to use more health care. Thus a key aspect of our research in this area has been to develop and apply methods that separate out the differences in costs across plans that can be attributed to selection effects from the differences in costs that can be attributed to incentive effects. Eichner is developing methods to isolate the incentive effects of plan provisions on expenditures from the selection effects. Employees who will have large medical expenditures are much more likely than those who will spend little to select plans with higher premiums, lower deductibles, and lower copayments. His initial results, based on instrumental variable techniques, suggest very substantial effects of plan provisions on expenditures, after controlling for selection effects.

### *More Public and Less Private Insurance*

Cutler and Gruber find that publicly provided health insurance tends to "crowd out" private insurance coverage.<sup>37</sup> Based on recent expansion in Medicaid eligibility for certain groups during 1987-92, they estimate that about 50 percent of the increase in Medicaid coverage was associated with a reduction

in private insurance coverage. This occurred largely because employees took up employer-based insurance less frequently. While estimated on the basis of specifically targeted Medicaid expansions, the results suggest a substantial trade-off between public and private coverage.

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## Research Summaries

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### Multinational Firms and the Diffusion of Skills and Technology

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Over the past decade we have been engaged in a series of studies

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of the operations of multinational firms (MNCs). These have included examinations of the causes of their existence and growth, their roles in world trade and production, and the effects of their expansion on their home countries and on the economies of the foreign countries in which they produce and sell. In this report, we summarize one part

of this work: studies of the role that MNCs have played in the diffusion of skills and technology to and within the host countries in which they operate.

While MNCs probably account for 20 to 25 percent of the world's total output, most of their production takes place in their home countries. The chief agency for dif-