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## Program Report

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## Health Care

Alan M. Garber\*

The NBER's Program on Health Care holds two program meetings annually, as well as NBER Summer Institute sessions, an annual "Frontiers in Health Policy Research Conference," and occasional theme meetings. Program members conduct research on a diverse range of issues in the economics of health, the delivery and financing of health care, and the interactions of health and health care with other areas of economic activity. Because Health Care is a large and active program, as reflected in the Working Papers issued by program members and in their presentations and publications, this report describes only a fraction of its work.

### Private Health Insurance

Most Americans pay for health care with private health insurance obtained through employers. The loss of employment-based insurance frequently leads to either enrollment in government programs like Medicaid or the loss of health insurance altogether. Michael Chernew, David M. Cutler, and Patricia S. Keenan examine why the share of Americans without health insurance rose over the 1990s, despite the relative prosperity of the decade. In one paper, they relate changes in health insurance cost growth to changes in insurance coverage rates across metropolitan areas, accounting for a broad set of additional factors that may affect changes in coverage.<sup>1</sup> They find that rising premiums accounted for over half of the decline in health insurance coverage during the 1990s. A \$1,000 increase in premiums is associated with a 2.6 percentage point decline in insurance coverage rates. They also project that rising health insurance costs will cause

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the number of uninsured to increase by 2 to 6 million people by 2010. In another paper, they report that the availability of uncompensated care leads to greater losses of insurance coverage when premiums rise.<sup>2</sup>

Many of the uninsured say that they lack health insurance because it is unaffordable. M. Kate Bundorf and Mark V. Pauly develop “normative” and “behavioral” definitions of affordability, examining whether health insurance is affordable to the currently uninsured. Analyzing data from the Medical Expenditure Panel Survey, they report that when a normative definition of affordability is used for family incomes above the poverty level, health insurance was affordable to 82 percent of the uninsured. Increasing the threshold to 2 and 3 times the poverty level, the proportions of the uninsured classified as able to afford coverage were 55 percent and 34 percent, respectively. These researchers also find that, with a “behavioral” definition of affordability, which is defined by the health insurance purchase behavior of individuals with similar economic circumstances, about half of the uninsured could purchase health insurance. Thus, these economists believe that affordability is not the sole barrier to health insurance coverage.<sup>3</sup>

Bundorf and Jay Bhattacharya also have examined whether there are offsetting wage decreases for workers with large expected health care costs by studying the wage patterns for obese workers.<sup>4</sup> Annual medical expenditures are \$732 higher on average for obese individuals than for normal weight individuals. In a paper on this subject, they report that obese workers with employer-sponsored health insurance pay for their higher expected medical expenditures through lower cash wages. This conclusion is strengthened by their finding that obese workers with insurance coverage through an alternative employer (for example, a spouse) do not experience similar wage offsets. Nor are there wage offsets for other types of fringe benefits whose cost to the employer is less likely to be affected by obesity.

## Medicare and Medicaid

Many Health Care Program members — including Bhattacharya, Amitabh Chandra, David M. Cutler, Mark Duggan, Amy Finkelstein, Victor Fuchs, Dana Goldman, Frank Lichtenberg, Thomas MaCurdy, Mark McClellan, Jonathan Skinner, and I — have studied aspects of the

Medicare and Medicaid programs, such as the causes of growth in program expenditures and the role of disability in future expenditures.

Amy Finkelstein has looked at the introduction of Medicare to learn how the introduction of universal insurance affects health spending and technology adoption.<sup>5</sup> Medicare, she hypothesizes, should have had a greater effect in areas of the country in which relatively few of the elderly had health insurance than in areas in which many of the elderly were insured prior to the introduction of the program. She examines an annual hospital-level dataset from 1948–75 for six hospital outcomes: total expenditures, payroll expenditures, employment, beds, admissions, and patient-days. She finds that the effects were indeed greater in areas in which health insurance was less common; prior to 1965, hospital admissions were growing more slowly in the low-insurance areas than in the high-insurance areas, but after 1965 this pattern reversed, with admissions growing much more quickly in those areas most affected by Medicare's introduction. Similar patterns are evident in the other hospital outcome variables, including expenditures. These results suggest that the overall spread of health insurance explains at least 40 percent of the dramatic increase in health spending in the United States between 1950 and 1990.

In a series of articles, Jon Skinner and colleagues have examined variation in expenditures for the care of Medicare beneficiaries and their implications for the efficiency of Medicare. For example, the range of variation in resources used for end-of-life care for Medicare beneficiaries in the United States is striking, even among top-rated hospitals.<sup>6</sup> Skinner and colleagues also use geographical variations in health care spending to measure the incremental value of health care intensity among the elderly Medicare population.<sup>7</sup> To correct for the reverse causation problem — that residents of “sicker” areas tend to require more health care — they use a set of instruments characterizing health care intensity either among hip fracture patients or among patients in their last six

months of life. Using various analytical methods, they find that a large component of Medicare expenditures — \$26 billion in 1996 dollars, or nearly 20 percent of total Medicare expenditures — appears to provide no survival benefit, nor is it likely that this extra spending improves the quality of life. While secular trends in health care technology have delivered large health benefits, variation in health care intensity at a point in time suggests that more is not better.

### Pharmaceutical Markets, Innovation, And Technology Diffusion

Health Care Program members have conducted a wide array of research addressing how technological innovation in medicine affects both health expenditures and health outcomes. They have also investigated the factors that promote or impede it technological innovation in medical care.

In a series of studies, Cutler and his collaborators have measured the benefits of specific medical innovations. For the most part, he has concluded, the benefits have been large and underappreciated. Much of the work is summarized in his book, *Your Money or Your Life*.<sup>8</sup> Extending work of Cutler and Mark McClellan on the contribution of medical innovations to changes in heart attack mortality among Medicare beneficiaries,<sup>9</sup> Skinner, Douglas Staiger, and Elliott Fisher examine Medicare costs and outcomes for Acute Myocardial Infarction (AMI) in the Medicare population during 1986–2002.<sup>10</sup> They find that the gains in mortality that Cutler and McClellan observed from 1986–98 did not continue subsequently, and that expenditures, after a brief pause, continued to increase. In cross-sectional analyses, they find that regions experiencing the greatest drop in mortality following AMI were not those with the largest gains in expenditures. Patients living in regions that had invested early in low-cost and highly effective care, such as beta blockers, experienced the largest declines in mortality with no adverse impact on expenditures. The factors yielding the greatest benefits to health were not the factors that

drove up costs, and vice versa.

Laurence C. Baker has developed important evidence on the ways that financial incentives, particularly those associated with managed care organizations, can influence technology diffusion. For example, his work on the diffusion of mid-level neonatal intensive care facilities,<sup>11</sup> like his earlier work examining other technologies such as magnetic resonance imaging and mammography,<sup>12</sup> shows that tightening financial incentives limits the diffusion of new technologies. This can have important implications for the subsequent utilization of health services and spending. Work by Baker and colleagues on the effects of the diffusion of several technologies in the late 1990s demonstrated their importance in influencing utilization and spending.<sup>13</sup> Baker also has examined the effects of technology diffusion on well-being. Baker and C. S. Phibbs show that, counter to expectation, slowing the diffusion of neonatal intensive care facilities can improve health outcomes, apparently by helping to direct high-risk births to hospitals that are most successful at caring for such low birth weight babies.

Government health insurance programs directly affect diffusion and the incentives to innovate through their influence on demand. Mark Duggan and Fiona M. Scott Morton examine the effects on drug pricing and innovation of what was, at least before 2006, the largest government drug program.<sup>14</sup> In 2003, Medicaid provided prescription drug coverage to more than 50 million people nationwide. To determine the price that it will pay for each drug, Medicaid uses the average private sector price. When Medicaid is a large part of the demand for a drug, this creates an incentive for its maker to increase the prices it charges other health care consumers. Using drug utilization and expenditure data for the top 200 drugs in 1997 and in 2002, they investigate the relationship between the Medicaid market share (MMS) and the average price of a prescription. Their estimates imply that a 10 percentage-point increase in the MMS is associated with a 7 to 10 percent increase in the aver-

age price of a prescription. In addition, Medicaid rules increase a firm's incentive to introduce new versions of a drug in order to raise price. These researchers find that firms producing newer drugs with larger sales to Medicaid are more likely to introduce new versions. Taken together, their findings suggest that government procurement rules can alter equilibrium price and product proliferation in the private sector.

Frank Lichtenberg also has studied the value of technological innovation in medical care. In a recent paper,<sup>15</sup> he has sought to understand the role of the introduction of new drugs on life expectancy changes over time and between nations. He estimates that about 40 percent of the two years added to the average life span between 1986 and 2000 can be traced to the introduction of new drugs. He suggests that it may take several years for a new drug to be diffused to more consumers and have its full impact on survival rates, and that spending on new drugs may be a cost-effective way to increase longevity.

Several groups of Health Care Program researchers have studied the incentives for innovation. Tomas J. Philipson and Anupam B. Jena have estimated the welfare gain resulting from the introduction of anti-HIV medications and the profits that companies producing the drugs have earned from them.<sup>16</sup> They report that profits only represent 5 percent of the consumer surplus attributable to the drugs, and suggest that policies that seek to limit consumption based on value to individual patients may provide inadequate rewards to innovating firms. Charles I. Jones, Paul M. Romer, and I also examine the incentives to innovate, drawing a distinction between static efficiency—when quantities correspond to the competitive equilibrium, when the drug already exists—and dynamic efficiency.<sup>17</sup> The latter condition requires that profits equal surplus. We find that the rewards to innovation can be too small or too large in the presence of health insurance, depending on the shape of the demand curve. Neeraj Sood and Darius Lakdawalla also address the ways to ensure that the inno-

erator receives adequate profits, while their patients also have adequate access to innovative products and technologies.<sup>18</sup> They show that in health care markets characterized by uncertainty and insurance, society may be able to ensure efficient rewards for inventors *and* the efficient dissemination of inventions. Health insurance resembles a two-part pricing contract in which a group of consumers pay an up-front fee *ex ante* in exchange for a relatively low fixed unit price *ex post*. This can allow innovators to extract sufficient profits— from the *ex ante* payment—but still sell the good at marginal cost *ex post*. As a result, their research shows that complete, efficient, and competitive health insurance markets lead to efficient innovation and utilization, even when moral hazard exists. Conversely, incomplete insurance markets lead to inefficiently low levels of innovation. Second, an optimally designed public health insurance system can solve the innovation problem by charging *ex ante* premiums equal to consumer surplus, and *ex post* co-payments at or below marginal cost. When these quantities are unknown, society almost always can improve static and dynamic welfare by covering the uninsured with contracts that mimic observed private insurance contracts.

In other work, these researchers develop an economic framework to discuss the social insurance aspects of several innovation policies including patents, research subsidies, and pre-commitments to buy.<sup>19</sup> They show that patents or rewards have an advantage over research subsidies when a new invention replaces an existing good at lower cost. Research subsidies have an advantage when inventions spawn an entirely new product.

## Racial Disparities In Health Care Delivery

The federal government, and a growing research literature, has sought to understand the causes of differences in health outcomes among different racial and ethnic groups within the United States. Much of their effort is directed toward finding the mechanisms respon-

sible for racial disparities. How much can be explained by differences in the medical care that white and non-white patients receive for the same disease?

In a series of papers, Chandra, Skinner, Staiger, and their colleagues have demonstrated the pivotal role that geography plays in racial disparities in health care. Because their work is based on analyses of Medicare claims files, they do not directly assess the role of variation in insurance coverage. They show that regions demonstrating a high level of racial disparity in the use of one procedure administered at the end of life are not especially likely to exhibit similar disparities in the use of unrelated procedures. Unusually large racial disparities in surgery are often the result of high white rates rather than low black rates. Differences in end-of-life care are driven more by residence than by race.<sup>20</sup>

A detailed picture of the importance of geography emerges in a study of mortality after heart attack.<sup>21</sup> In an analysis of fee-for-service Medicare patients hospitalized for heart attack during 1997–2001 (with a sample greater than one million), the researchers classified more than 4,000 hospitals into approximate deciles depending on the extent to which the hospital served the African-American population. Decile 1 (12.5 percent of AMI patients) included hospitals without any African-American AMI admissions during 1997–2001. Decile 10 (10 percent of AMI patients) included hospitals with the highest fraction of black AMI patients (33.6 percent). The main outcome measures were 90-day and 30-day mortality following AMI.

Patients admitted to hospitals disproportionately serving African-Americans experienced no greater level of morbidities or severity of the infarction. Yet hospitals in Decile 10 experienced a risk-adjusted 90-day mortality rate of 23.7 percent (the 95 percent confidence interval is 23.2–24.2) compared to 20.1 percent (the 95 percent confidence interval is 19.7–20.4) in Decile 1 hospitals. Differences in outcomes between hospitals were not explained by income, hospital ownership status, hospital volume,

Census region, urban status, or hospital surgical treatment intensity. Thus, risk-adjusted mortality following AMI is significantly higher in U.S. hospitals that disproportionately serve African-Americans. Policies that try to equalize racial differences in outcomes within areas may have little effect on disparities overall, while a reduction in overall mortality at these hospitals could reduce dramatically black-white disparities in health. Other studies by the same group draw similar conclusions.<sup>22</sup>

Peter W. Groeneveld and I, in papers with Paul A. Heidenreich and Sara Laufer, have observed similar phenomena for other cardiac treatments. For example, in an analysis of Medicare claims files for the years 1990–2000, we found that black patients had higher mortality following cardiac arrest than white patients, and that the difference in outcomes was explained in part by the lower rate at which black patients received implantable cardioverter-defibrillators.<sup>23</sup> We then examined whether similar disparities characterized the use of the devices for ventricular arrhythmias. In the early 1990s, black patients with ventricular arrhythmias were about half as likely as whites to receive the devices, but by 1999, they received the devices at about two-thirds the rate of whites. Declining geographic variation in device implantation explained about 20 percent of the reduction in racial disparity.<sup>24</sup>

Hypothesizing that labor market inequality may be reflected in differences in non-wage compensation, Helen Levy examines white-nonwhite and male-female differences in health insurance coverage among full-time workers.<sup>25</sup> She finds that two-thirds of the gap in insurance coverage for blacks or Hispanics is explained by differences in observable characteristics (primarily education and occupation). The gap for women is not explained by controlling for observables. However, for women, coverage from other sources — primarily employer-sponsored coverage as a dependent rather than as a policyholder — more than makes up for their lower rates of own-employer coverage. Consequently female workers are less

likely to be uninsured than male workers. The same is not true for blacks and Hispanics: their rates of coverage from other sources are also lower than rates for whites, so that they are significantly more likely to be uninsured even after adjusting for observables. Examining the period from 1980 to 2000, she finds that the adjusted gap in own-employer coverage for women has been relatively flat over this period and is about half as large as the male/female wage gap, so that measuring inequality in wages plus health insurance would result in a smaller estimate of male/female compensation inequality than measuring wages alone. The same is generally true for blacks, although their health insurance gap is much closer in magnitude to their wage gap. For Hispanics, the health insurance gap is nearly identical to the wage gap and both are increasing over time. Thus, Levy finds no evidence that adding health insurance to estimates of labor market compensation inequality would widen disparities for women versus men, blacks versus whites, or Hispanics versus whites.

## Industrial Organization of Medical Care

NBER researchers have played an important part in the application of industrial organization approaches to medical care issues. There continues to be a great deal of interest in the behavior of for-profit and not-for-profit institutions, which often compete with one another in, for example, markets for hospital services. It is widely believed that for-profit and not-for-profit hospitals offer different service mixes, in part because for-profits more aggressively seek well-insured patients. In an analysis of American Hospital Association data for every U.S. urban, acute care hospital (1988–2000), Jill R. Horwitz asks how service profitability affects hospital specialization, comparing government, non-government nonprofit, and for-profit hospitals.<sup>26</sup> She categorizes more than 30 services as relatively profitable, unprofitable, or variable. For-profits are most likely to offer relatively profitable medical services; government hospitals

are most likely to offer relatively unprofitable services; nonprofits fall in the middle. For-profits are also more responsive to changes in service profitability than the other two types.

These different approaches to service mixes should affect the financial performance of the different ownership types. Yu-Chu Shen and colleagues apply meta-analytical methods to synthesize studies that investigate the effect of ownership on hospital financial performance, focusing on two questions: 1) what is the magnitude of the ownership effect on financial performance? 2) how do differences in analytic methods and other study features affect the estimates of ownership effect?<sup>27</sup> In a systematic review of 41 studies, they find that the diverse results in the hospital ownership literature can be explained largely by differences in underlying theoretical frameworks, assumptions about the functional form of the dependent variables, and model specifications. Weaker methods and functional forms tend to predict larger differences in financial performance between not-for-profits and for-profits. The combined estimates across studies suggest little difference in cost among all three types of hospital ownership, and that for-profit hospitals generate more revenue and greater profits than not-for-profit hospitals, although the difference is only of modest economic significance. There is little difference in revenue or profits between government and not-for-profit hospitals.

To study the interaction between competing not-for-profit and for-profit hospitals, Duggan asks whether the behavior of private not-for-profit hospitals is systematically related to the share of nearby hospitals organized as for-profit firms.<sup>28</sup> His findings show that the not-for-profit hospitals in areas with predominantly for-profit hospitals are significantly more responsive to a change in financial incentives than their counterparts in areas served by few for-profit providers. Differences in financial constraints and other observable factors correlated with for-profit hospital penetration do not explain the heterogeneous response. The findings suggest that not-for-profit

hospitals mimic the behavior of private for-profit providers when they actively compete with them.

Modifying physician behavior, and understanding how physicians respond to incentives, is an increasing focus of policy as interest in pay-for-performance and other programs to improve the quality of health care has grown. Physician incentives are controversial because they may induce doctors to make treatment decisions that are not in the best interests of their patients. Martin Gaynor, James B. Rebitzer, and Lowell J. Taylor examine the effect of physician incentives in an HMO network.<sup>29</sup> They set out a theoretical framework for assessing the degree to which incentive contracts do in fact induce physicians to deviate from a standard guided only by patient interests and professional medical judgment. They analyze details of an HMO's incentive contracts, along with internal expenditure records, in their empirical evaluation of the model. They estimate that the HMO's incentive contract provides a typical physician an increase, at the margin, of ten cents in income for each dollar reduction in medical utilization expenditures. The average response is a 5 percent reduction in medical expenditures. These researchers also find suggestive evidence that financial incentives linked to commonly used quality measures may stimulate an improvement in measured quality.

The economics of the pharmaceutical industry remains an important topic both because the industry is an important source of major advances in care and because the industry has undergone dramatic change in the past decade. Perhaps the most visible manifestation of change has been industry consolidation; the success of mergers is a matter of interest not only to investors but also to anyone concerned with pharmaceutical innovation. Patricia M. Danzon, Andrew Epstein, and Sean Nicholson examine the determinants of merger and acquisition activity in the biotech and pharmaceutical industry between 1985 and 2000, as well as the impact of a merger on a firm's market value, employment, R and D expenditures, and sales.<sup>30</sup> They find evidence sup-

porting the hypothesis that firms merge in part to avoid having excess capacity once their products lose patent protection and/or their late-stage drugs fail in clinical trials. This analysis of post-merger performance strongly confirms the importance of controlling for pre-merger firm characteristics. Once the researchers control for a firm's propensity to merge, they find that mergers have very little effect on a firm's subsequent growth in market value, employees, R and D expenditures, and sales among large biotech/pharmaceutical firms. For small firms, however, mergers appear to be an effective growth strategy, presumably because mergers provide a source of funds for financially distressed firms.

## Other Health Care Program Research

Health Care Program research spans a wide range of other areas. For example, Christopher Ruhm has studied the relationship between the macroeconomy and health, showing that mortality increases during economic downturns.<sup>31</sup> And, David Meltzer has examined how a change in the organization of hospital care — placing hospitalized patients in the hands of “hospitalist” physicians who devote nearly all of their work time to inpatient care — can both lower costs and improve hospital outcomes.

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