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ment that we find for other policies do not vary much by approach. Furthermore, we find that the effects of the policies on total hours worked are very similar to the results for employment as a whole.

Our detailed examination of the policy changes between 1984 and 1996 uses two large microdata sets. Our results indicate that changes in EITC and other taxes played a dominant role in the employment increases of single mothers between 1984 and 1996. This suggests that policies that "make work pay" are effective in increasing work by single mothers. This lesson is important in that it shows that work can be encouraged by making employment more attractive through tax incentives as well as

by making welfare less attractive through measures such as time limits and work requirements.

¹ B. D. Meyer and D. T. Rosenbaum, "Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers," *NBER Working Paper No. 7363*, September 1999, and *Quarterly Journal of Economics*, 116 (August 2001), pp. 1063–114; and B. D. Meyer and D. T. Rosenbaum, "Making Single Mothers Work: Recent Tax and Welfare Policy and Its Effects," *NBER Working Paper No. 7491*, January 2000, and *National Tax Journal* 53, (December 2000), pp. 1027–62, and in *Making Work Pay: The Earned Income Tax Credit and Its Impact on American Families*, B. D. Meyer and D. Holtz-Eakin, eds., forthcoming from Russell Sage Foundation Press.

² For related arguments see D. T. Ellwood,

"The Impact of the Earned Income Tax Credit and Social Policy Reforms on Work, Marriage, and Living Arrangements," *National Tax Journal*, 53:4 Pt. 2 (December 2000), pp. 1063–106; *National Research Council*, *Evaluating Welfare Reform: A Framework and Review of Current Work*, R. Moffitt and M. Ver Ploeg, eds. Washington, DC: National Academy Press, 1999; and C. Jencks and J. Swingle, "Without a Net," *The American Prospect*, 11 (January 3, 2000).

³ Wage changes over this period are unlikely to provide an alternative explanation for the changes in employment of single women without children relative to single mothers. When we account for changes in the observed characteristics of single mothers and single women without children in a log wage regression, the changes in hourly wages over time are similar for the two groups of single women.

Medical Care and Economywide Price Indexes

Joseph P. Newhouse*

It is well known that price indexes for service industries are subject to considerable error. However, errors in medical care price indexes are particularly significant because of that sector's share of the economy. Although the United States is an outlier with more than 13 percent of its GDP devoted to medical care in recent years, the share for other developed countries—typically between 7 and 11 percent—generally has been rising. The accuracy—or inaccuracy—of medical care price indexes has become sufficiently important that Alan Greenspan has taken note of it publicly.¹

A group of NBER researchers have been working for several years both to quantify biases and to suggest technical improvements to medical care

price indexes.² In a recent paper, I attempt to synthesize our results with those of other investigators and to put the work in a larger context.³

I make two principal points: First, although it is difficult to be precise about the amount of bias in the medical care price index, a number of studies have quantified the effects of its various problems. The results suggest that the bias may be large enough to have a nontrivial effect on the overall index. On the basis of some of the early studies, the Boskin Commission estimates that the medical care component of the consumer price index (CPI) was biased upward by 3 percentage points annually.⁴ Second, the amount of bias may change from year to year. This possibility has important implications for monetary policy.

Some Causes of Bias in the Indexes

There are many reasons why the official medical care indexes may

overstate the change in a cost-of-living index. Fortunately, some of the historical reasons have been corrected. For example, the CPI has measured the price of a hospital stay rather than the price of a hospital day since 1997. Between 1980 and 1995, the average length of a patient's stay fell 27 percent. Ignoring any effect on outcomes, this change clearly reduced the cost of treatment. Nevertheless, that reduction in cost was not proportional to the reduction in length of stay because marginal cost falls throughout a stay and care outside the hospital is frequently substituted for the marginal day. Before 1997, the CPI did not register the decrease in cost that resulted from shorter stays because it was pricing the cost of a day in the hospital. Indeed, pricing the cost of a day probably sent a perverse signal: because marginal costs rose as stays shortened, the average cost of a day rose with the fall in length of stay. (When the producer price index for hospitals was intro-

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duced in December 1991, it priced the cost of a stay.)

Another improvement that was introduced into the medical care CPI in 1997 was the grouping of inpatient and outpatient surgical procedures in a single category. Prior to that time, a given procedure conducted in the hospital was treated as a different service when it was performed outside the hospital. Of course, because a hospital stay is avoided, performing a procedure on an outpatient basis is much cheaper. Between 1980 and 1996, the percentage of procedures done on an outpatient basis rose from 16 percent to 60 percent. (I have not found a dollar-weighted figure, but it would surely show a smaller—but still substantial—increase.) By treating inpatient and outpatient treatment as separate services, the CPI did not recognize the savings. Irving Shapiro, Matthew D. Shapiro, and David W. Wilcox estimate that between 1969 and 1994, a price index for cataract surgery ignored the shift of the procedure out of the hospital, thus overstating the rate of price increase by 5 percentage points annually.⁵

Accounting for improved outcomes is probably the most intractable problem remaining in the medical care indexes. The problem has two sources: first, new services may improve quality; second, better management of care may move the production of health care closer to its potential best outcome.

New goods and services invariably pose difficulties for price indexes. One theoretically satisfactory way to handle them—a hedonic price index for medical care—would be difficult to implement because of the widespread nature of medical insurance and its associated “administered prices.” Probably the only feasible method for addressing improved methods of care would be direct adjustment by the statistical agencies. However, the agencies naturally have been resistant to this course because of the judgment required. Instead, the agencies typically have dealt with new

goods and services by linking them into the index and making no adjustment for quality change. But the adjustments could be very important. For example, David M. Cutler, Mark B. McClellan, and I show that failing to account for reduced mortality from better treatment of heart attacks in 1984–91 biased a price index for heart attacks upward by 4 to 6 percentage points annually.⁶

Outcomes also can be improved through better application of existing knowledge. Recently, there has been much publicity about the extent of medical error, which is estimated to cause 44,000 to 98,000 deaths annually.⁷ Medical error is only the most visible target of ways to improve quality of care, however. One-sixth to one-third of several common procedures are estimated to have benefits that are not commensurate with their clinical risk, let alone their resource cost.⁸ In short, medical care seems to be far from a production possibility frontier. Although managed care perhaps is best noted for lowering unit prices, one of its original rationales was that it would move production closer to the frontier.

A number of researchers have attempted to estimate the effects of improved treatment of depression.⁹ They find that the proportion of treatment that satisfies clinical guidelines rose from 35 percent in 1991 to 55 percent in 1996, a gain the investigators attribute primarily to the spread of managed care for behavioral health. Accounting for the expected effect of this improved treatment on outcomes implies a 2-to-6 percentage-point reduction during this period in a price index for the treatment of depression.

For these and other reasons, the Boskin Commission’s estimate of a 3 percentage-point annual bias in the medical care CPI may well be low. However, even a bias of that size is sufficient to cause a 0.15 percentage-point annual bias in the all-items CPI. (Medical care has a weight of only 5 percent in the CPI versus 13 percent in the GDP deflator because government-

financed medical care and employer-paid health-insurance premiums are beyond the scope of the CPI.) And biases in the CPI have substantial effects on the federal budget. The Boskin Commission estimates that a single percentage-point bias in the all-items CPI would raise the national debt by about \$1 trillion over a 12-year period. This is about one-fifth of the current debt and an even higher percentage of the publicly held debt.

Monetary Policy and Changes in the Bias

One important use of price indexes is in the determination of monetary (and possibly fiscal) policy. For monetary policy, any constant bias in a price index is of little consequence; it will implicitly enter the rate of equilibrium inflation at the nonaccelerating inflation rate of unemployment (NAIRU). But any changes in the bias are obviously important because the central bank is prepared to act on even rather modest changes in overall price indexes. Unfortunately, much less work has been done to date on the degree of instability in the bias.

I make the case that the annual bias in the medical care index may have increased by 2 to 3 percentage points in 1993–7, resulting in a change of around 0.3 percentage points in the bias in the GDP deflator.¹⁰ I focus on those years because the rate of increase in real spending per person on medical care services fell to about 2 percent per year from its 50-year historical average of 4 to 5 percent per year. The sustained fall in the growth rate of spending during this five-year period has no precedent in the post-World War II period.

The spread of managed care offers the only plausible explanation for much of this decline. Although the number of enrollees in various kinds of managed-care contracts is somewhat uncertain, clearly there was a sharp increase just before and during the 1993–7 period. One estimate, for example, is that the share of the pri-

ately insured population that was enrolled in some form of managed care jumped 50 percentage points between 1987 and 1995.

There is further uncertainty about how much of the fall in spending is attributable to a reduction in unit prices rather than a reduction in the real quantity of services, but it appears that much of the decrease was in transaction prices. For example, Cutler, McClellan, and I show that health maintenance organizations (HMOs) in Massachusetts treated their enrollees' heart attacks much as indemnity insurers did, but the HMOs paid 40 percent less for each type of treatment.¹¹

Unfortunately, the official indexes probably did not account for much of the reduction in transaction prices attributable to managed care because medical providers are reluctant to share transaction prices with the Bureau of Labor Statistics. For example, in 1996 only 15 percent of the quotations in the hospital price index were transaction prices: the rest were list prices.¹² Thus, the change in the bias in the medical care indexes could have caused a nontrivial change in the bias in the overall indexes during the 1990s, a factor that could have played a role in the apparent fall of the NAIRU in those years.

In sum, although the accuracy of medical care price indexes has improved, there are still substantial opportunities for further improvement. However, assigning value to better outcomes and obtaining transaction prices are not trivial tasks. Therefore, statistical agencies probably will require additional resources for implementing the opportunities for improvement.

¹ A. Greenspan, "The Challenge of Measuring and Modeling a Dynamic Economy," (remarks at the Washington Economic Policy Conference of the National Association for Business Economics, Washington, DC, March 27, 2001), available from World Wide Web @ <http://www.federalreserve.gov/boarddocs/speeches/2001/20010327/default.htm>.

² E. R. Berndt et al., "The Medical Treatment of Depression, 1991–1996: Productive Inefficiency, Expected Outcome Variations, and Price Indexes," NBER Working Paper No. 7816, July 2000; E. R. Berndt et al., "Medical Care Prices and Output," in Handbook of Health Economics, A. J. Culyer and J. P. Newhouse, eds. Amsterdam: Elsevier, 2000; E. R. Berndt et al., "Price Indexes for Medical Care Goods and Services: An Overview of Measurement Issues," in Medical Care Output and Productivity, E. R. Berndt and D. M. Cutler, eds. Chicago: University of Chicago Press, 2001; E. R. Berndt, S. M. Busch, and R. G. Frank, "Treatment Price Indexes for Acute Phase Major Depression," in Medical Care Output and Productivity; D. M. Cutler et al., "Are Medical Prices Declining?" Quarterly Journal of Economics, 113 (November 1998), pp. 991–1024; D. M. Cutler, M. McClellan, and J. P. Newhouse, "The Costs and Benefits of Intensive Treatment for Cardiovascular Disease," NBER Working Paper No. 6514, April 1998, and in Measuring the Prices of Medical Treatments, J. Triplett, ed. Washington, DC: The Brookings Institution, 1999; D. M. Cutler et al., "Pricing Heart Attack Treatments," NBER Working Paper No. 7089, April 1999, and in Medical Care Output and Productivity; J. E. Triplett, ed. Measuring the Prices of Medical Treatments; and J. E. Triplett, "What's Different about Health? Human Repair and Car Repair in National Health Accounts," in Medical Care Output and Productivity.

³ J. P. Newhouse, "Medical Care Price Indices: Problems and Opportunities/The Chung-Hua Lectures," NBER Working Paper No. 8168, March 2001, and

Academia Economic Papers, 29 (2000), pp. 1–65.

⁴ M. J. Boskin et al., Toward a More Accurate Measure of the Cost of Living, final report from the Advisory Commission to Study the Consumer Price Index, prepared for the Finance Committee, U.S. Senate, 1996.

⁵ I. Shapiro, M. D. Shapiro, and D. W. Wilcox, "Measuring the Value of Cataract Surgery," Medical Care Output and Productivity.

⁶ D. M. Cutler et al., "Are Medical Prices Declining?"

⁷ W. C. Richardson, "To Err is Human: Building a Safer Health System" (paper presented at a public briefing of the Institute of Medicine of the National Academy of Sciences, Washington, DC, December 1999.)

⁸ M. R. Chassin et al., (1987), "Does Inappropriate Use Explain Geographic Variation in the Use of Health Care Services? A Study of Three Procedures," Journal of the American Medical Association, 258: 18 (1987) pp. 2533–7.

⁹ E. R. Berndt et al., "The Medical Treatment of Depression, 1991–1996: Productive Inefficiency, Expected Outcome Variations, and Price Indexes"; E. R. Berndt, S. M. Busch, and R. G. Frank, "Treatment Price Indexes for Acute Phase Major Depression"; and S. H. Busch, E. R. Berndt, and R. G. Frank, "Creating Price Indexes for Measuring Productivity in Mental Health Care" (2000, photocopy).

¹⁰ J. P. Newhouse, "Medical Care Price Indices: Problems and Opportunities/The Chung-Hua Lectures."

¹¹ D. M. Cutler, M. B. McClellan, and J. P. Newhouse, "How Does Managed Care Do It?" RAND Journal of Economics, 31(Autumn 2000), pp. 526–48.

¹² U.S. General Accounting Office, Consumer Price Index: Cost-of-Living Concepts and the Housing and Medical Care Components, report to the ranking minority member, Committee on Banking and Financial Services, U. S. House of Representatives, 1996.

