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Abstract

A key issue in health care reform is the need to contain the inflation rate of the CPI for health care services without substantially reducing the quality of health care. Althought the previous literature has widely debated the causes of increasing inflation in the CPI for health care services, very little has been done to empirically test these arguments. We use an econometric framework that allows us to expressly examine the determinants of the inflation rate of the CPI for health care services. The data cover the period from 1960-1994. The main results provide empirical verification for many of the demand-side and supply-side theories of the inflation rate of the CPI for health care services that have been widely discussed in the literature. (*JEL* I1)

The Issue

Two basic concerns in health care reform are the need to increase access to services and to contain the percentage rate of change (inflation rate) of the consumer price index for health care services (hereafter, IRHC) without substantially reducing the quality of health care. Because of the rapid rate of increase in the IRHC over the last quarter century, a large number of schemes to control IRHC have been proposed. However, it is difficult to evaluate the relative merits of these policy proposals without a concrete understanding of the factors underlying the rising IRHC. Accordingly, it seems worthwhile to re-examine the factors that may have contributed to the trend of IRHC in recent years.

The contribution of this paper is entirely empirical. Unlike most previous studies, we use an econometric framework that allows us to examine the determinants of the IRHC. The study period runs from 1960 through 1994. Our main results provide empirical verification for many of the demand-side and supply-side theories of health care cost determination that have been widely discussed in the literature. We find that the percentage of population over age 65 and the percentage of population covered by Medicare have a significant, positive impact on the IRHC. The previous discussions in the literature on real malpractice medical premiums are inconclusive; by contrast, our analysis indicates that real average malpractice medical premiums have contributed to the pattern of the IRHC. Improvements in medical technology positively impact the IRHC, while the increase in the number of physicians per 100,000 people exercises a negative impact on the IRHC over time.

The study proceeds as follows. The next section discusses the trends in health care expenditures in the U.S., which is followed by a brief review of the previous literature on health care costs. Next, we describe

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the data and the empirical model and report the empirical findings. The last section provides some conclusions and policy implications.

Trends in Health Care Expenditures in the U.S.

The high cost of health care has often been attributed to lack of a competitive health care market. The health care industry has several characteristics that impede competition both in its structure and operation. They include imperfect knowledge about health care services by consumers, the institution of third party payment for health care services, licensing requirements for practicing medicine, and limited admissions to medical schools. Hence, this sector is less subject to the discipline of the marketplace and probably has smaller incentives to cut costs or implement market-based trade-offs than industries with a more competitive market structure. While the lack of competitiveness may potentially explain part of the high level of health care costs, it does not explain the rise in health care costs, unless there has been a corresponding decline in the industry's competitiveness over time. However, Baumol (1988) states "... that instead of growing weaker, competitiveness in health care markets has been increasing for well over a decade."

Newhouse (1992) estimates that in the last five decades, the increase in real per capita health costs has averaged about 4 percent per year, except for the period 1960-1970, when it averaged 6.5 percent. This has substantially exceeded the annual rate of real GDP growth, which ranged from 3.1 percent in 1950-1960 to 1.7 percent in 1980-1990. The health care share of GNP in the corresponding period increased from 4.5 percent to 12.2 percent. Warshawsky (1991) indicates that the share of hospital care in health care expenditures rose from 18 percent in 1929 to 42 percent in 1982. During this period, the share of physicians' services in health care spending declined from 28 percent to 17 percent. Since 1982, the share of hospital care declined from 42 percent to 38 percent while the share of physicians' services increased from 17 percent to 19 percent of the health care costs, reflecting in part the change in the Medicare payment system for hospitals in 1983 and the substitutability between hospital care and physicians' services. In addition, the trend in recent years is toward greater use of outpatient services. The share of nursing home care in health care spending rose from approximately 0 percent to 8 percent over the period from 1929-1990. The share of research and construction in total health care spending, however, declined in the 1980s.

From a different perspective, OECD studies (1992) indicate that per capita health expenditures in the United States are twice the OECD average. In 1990, health care expenditures absorbed about 12.1 percent of the GDP in the U.S. as compared to the OECD average of 7.5 percent. Table 1 compares health care inflation in the U.S. with those of select OECD countries.

TABLE 1: HEALTH CARE EXPENDITURES:
COMPARISON OF U.S. AND SOME OECD COUNTRIES

	Average Annual Growth Rates	
	Real GDP (1970-1990)	Real Expenditures (1970-1990)
USA	2.8	5.5
Japan	4.3	6.3
Germany	2.4	4.0
France	2.7	4.9
Italy	3.0	5.1
United Kingdom	2.2	3.9
Canada	3.8	5.0

Source: OECD (1992), U.S. Health Care at the Cross-Roads

Models of Health Care Costs

The literature has cited various reasons for rising health care costs. Feldstein's (1971) analysis indicates that the increase in per diem hospital costs was because of more personnel per patient day, higher wage rates, increased use of non-labor inputs per patient day, and higher prices for non-labor inputs. Rosko and Broyles (1988) indicate that the average cost of patient care rose from $45 in 1965 to $551 in 1985 or about 12.7 percent per year. Arnett et al. (1986), from the Health Care Financing Administration, attributed the rise in health care costs from 1974-1984 to general inflation, growth and change in the composition of population, increases in per capita patient days, and intensity of health care services. Rosko and Broyles (1988), focusing on the hospital industry, have attributed rising costs to both demand-pull and cost-push factors. Zeckhauser (1994) argues that some of the increase in health care costs may reflect rents to health care providers. Warshawsky (1991) also presents the case that the spread of medical insurance coverage may have distorted choices, leading to a moral hazard problem. A study by Buchanan et al. (1991), using data from 1974 to 1981, indicates that the level of health care expenditure is somewhat sensitive to the cost-sharing features of insurance plans, especially in the case of outpatient spending. Weisbrod (1991) argues that increased medical insurance coverage has increased technological change and led to health care cost increases.

Newhouse (1992) has discussed factors that could potentially account for the growth rate in medical expenditures. These include demand side factors such as aging, the spread of insurance, and the growth of income. The supply side factors include supplier-induced demand, slow productivity growth, increases in medical malpractice premiums, and technological change that has greatly enhanced the capabilities of medicine by introducing new types of expensive medical equipment and procedures. Gerdtham et al. (1992) empirically investigate factors behind the variance in health care expenditures in OECD countries. The significant regressors in their analysis are per capita income (GDP), urbanization   share of public financing to total expenditure, share of inpatient care to total expenditure, and a dummy variable for countries with fee-for-service as the dominant remuneration in outpatient care. We now briefly discuss how these factors are treated in the present study.

Model Variables

Age

The expenditure on medical care may have increased as the total population that is elderly has increased. The population over the age of 65 increased from 8 percent of the total population in 1950 to 12.7 percent in 1994. Since the elderly tend on average to require relatively more medical attention due to the impact of aging, we would expect that the IRHC is an increasing function of the percentage of the population over the age of 65.

Medical Care Coverage

The introduction of Medicare has clearly facilitated greater access to health care services. The greater the percentage of the population covered by Medicare, the greater the growth rate of demand for medical services and hence the greater the IRHC thereof. Thus, we include the percentage of population covered by Medicare in our analysis.

Supplier-Induced Demand

McGuire and Pauly (1991) argue that as the number of physicians has increased, they have induced additional demand to protect their incomes, such as increasing the volume and variety of tests and procedures. In addition, with the threat of malpractice suits, doctors may prescribe additional tests as a defense mechanism; however, it may not be possible to account directly for the increase in defensive medical practices. Nevertheless, we have attempted to capture both these ideas in our model by including as independent variables the number of physicians per population of 100,000 and the pattern of real average medical malpractice premiums.

Inflation

Rosko and Broyles argue that "the health care industry has been the focus of intensive scrutiny because its rate of inflation has consistently exceeded that of most other industries." Their analysis indicates that the value of consumer price index for all items except medical care rose by an average annual rate of 5.9 percent between 1965 and 1985, whereas the medical care services index rose annually on average by 7.4 percent. Following the Health Care Financing Administration (1986), we include the percentage rate of change in overall CPI in our analysis to account for the impact of general inflation in the economy on the IRHC.

Technology

Technological advances in the health care industry include both new equipment and new medical procedures. High-tech equipment and medical treatment involve enormous amounts of research investment and are generally very expensive innovations. Hence, this may be an important factor contributing to the increase in IRHC. For lack of dependable data, we simply proxy technology change by using a dummy variable for the introduction of Magnetic Resonance Imaging (MRI).

Empirical Analysis

Data

Our analysis covers the period from 1960-1994. The year 1960 is the earliest for which all data are available. The dependent variable is the inflation rate of the consumer price index for health care services (IRHC). The explanatory variables are percentage rate of change in overall CPI, percentage of population over the age of 65, number of physicians per 100,000 of population, real average medical malpractice premiums, and a dummy for the MRI technology. All the data were obtained from the *Economic Report of the President* (1995) and the American Medical Association. To avoid simultaneity problems, all of the right hand side variables are lagged.

Econometric Model

The empirical specification of the health care inflation model is as follows:

$$IRHC_t = a_0 + a_1 IR_{t-1} + a_2\, phy_{t-1} + a_3\, over65_{t-1} + a_4\, mal_{t-1} + a_5\, care_{t-1} + a_6\, dmri_{t-1} + e_t \qquad (1)$$

where *IRHC* is the inflation rate of the consumer price index for health care services, *IR* is the percentage rate of change in overall CPI, *phy* is the number of physicians per 100,000 population, *over65* is the percentage of the total population over 65 years, *mal* is the real average malpractice medical insurance, *care* is the percentage of the population covered by Medicare, and *dmri* is the dummy variable for introduction of Magnetic Resonance Imaging. Variable *dmri* assumes a value of 0 until one year before 1982, when MRIs were introduced to the public, and a value of 1 beginning with the year 1982. The data are annual, and all right-hand side variables are lagged one year. Ordinary least squares (OLS) are used to estimate this model. The Cochrane-Orcutt procedure is employed to correct for first order autocorrelation.

Results

$$IRHC_t = 32.1 + 0.53\, IR_{t-1} - 3.02\, phy_{t-1} + 8.24\, over65_{t-1} + 0.01\, mal_{t-1} + 0.11\, care_{t-1} + 1.7\, dmri_{t-1} \qquad (2)$$
$$\quad\ (+6.35) \qquad (-3.16) \qquad\quad (+2.75) \qquad\quad (+3.49) \qquad (+4.20) \qquad (+2.41)$$

where the terms in parentheses are t-values, and the R^2 value is 0.82.

All estimated coefficients are statistically significant at the 5 percent level or beyond. The coefficient of determination indicates that the model explains well over four-fifths of the health care inflation over the study period. The results of the estimate highlight some interesting aspects of the arguments in the literature about the rising IRHC. Among the demand-side factors, percentage of population over 65 both exercises a

highly significant and positive impact on the IRHC. On the supply side, previous literature predicted a positive relationship between the IRHC and the number of physicians per 100,000, as doctors sought to protect their incomes. Our analysis, however, reveals a highly significant and negative relationship. This may be attributed to the fact that the increase in the number of physicians led to greater competition in providing medical services. Previous literature has not provided conclusive evidence on the role of defensive medical practices in determining the IRHC. Reynolds et al. (1987) estimated the cost of defensive medicine related to ambulatory care in 1984 to be 16 percent of the total expenditures on physicians' services. Newhouse (1992) has however argued that "even if defensive medicine were zero in 1940, its growth can only account for a trivial fraction of the expenditure increase." Warshawsky's (1991) analysis indicates that "relatively little of the increase in health care spending and prices in the 1980s can be attributed directly to the influence of malpractice claims." In our analysis, the coefficient on the real average malpractice premium is positive and significant at the 1 percent significance level, indicating that the increase in malpractice premiums is an important factor in the pattern of the IRHC. Our other findings, consistent with the existing literature, are that the Medicare coverage and technological change both have a positive and significant impact on the IRHC in the U.S., as does the overall CPI inflation rate.

Conclusion

The pattern of an increasing IRHC and alleged inadequate access to health care services have been the focuses of the recent health care policy debate. Our analysis has been motivated by the fact that although the previous literature has widely debated the causes of increasing health care inflation rates, relatively little has been done to formally empirically test these arguments. The results of our analysis contribute to the health care debate by providing additional empirical evidence regarding the factors underlying IRHC. These results may be especially useful in view of the ongoing discussion on containment of health care costs and its far reaching effects on all sections of our society, especially the lower income groups and the elderly.

Our analysis focuses on the long-term factors that account for the rising IRHC in the U.S. This may help us to distinguish between policy measures that lead to a one-time effect on the level of health care expenditures and those that affect the IRHC. To some extent, health care reform may best be achieved by focusing on factors that can contribute to a sustained deceleration in the pattern of the IRHC. Among other things, our results reveal that an increase in the number of physicians per population of 100,000 has the procompetitive effect of reducing IRHC. Active promotion of measures that stimulate competition in the health care industry may be a worthwhile inflation containment strategy. The significance of real average medical malpractice premiums in contributing to IRHC suggests the need to include this factor as an important variable in health care inflation containment measures. For instance, some form of limited income tax credit for malpractice insurance might be considered.

References

Arnett, R.H., D.R. McKusick, S.T. Sonnefeld, et al. "Projections of Health Care Spending to 1990." *Health Care Financing Review* 7(3): 1-36.

Baumol, W.J. 1988. "Containing Medical Costs: Why Price Controls Won't Work." *The Public Interest* 95: 37-53.

Buchanan, J.L., B.K. Emmett, J.E. Rolph, and M.R. Homer. 1991. "Simulating Health Care Expenditures Under Alternative Insurance Plans." *Management Science* 17: 1067-1090.

Feldstein, M.S. 1971. *The Rising Cost of Hospital Care.* Washington, D.C.: Information Resource Press.

Manning, W.G., J.P. Newhouse, N. Duan, E.B. Keeler, A. Leibowitz, and M.S. Marquis. "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment." *American Economic Review* 77: 251-277.

McGuire, T.G., and Pauly, M.V. 1991. "Physician Response to Fee Changes with Multiple Payers." *Journal of Health Economics* 10: 385-410.

Newhouse, J.P. 1992. "Medical Care Costs: How Much Welfare Loss?" *Journal of Economic Perspectives*

6(3): 23-42.

_____. 1994. "Symposium on Health Care Reform." *Journal of Economic Perspectives* 8(3): 3-11.

OECD. 1992. *U.S. Health Care at the Cross-Roads*. Paris: OECD.

Reynolds, R., J.A. Rizzo, and M.L. Gonzalez. 1987. "The Cost of Medical Professional Liability." *Journal of the American Medical Association* 257: 2776-2781.

Rosko, M.D., and R.W. Broyles. 1988. *The Economics of Health Care*. New York: Greenwood Press.

Warshawsky, M.J. "Factors Contributing to Rapid Growth in National Expenditures on Health Care." Finance and Economics Discussion Series, #182. Washington D.C.: Federal Reserve Board.

Weisbrod, B. 1991. "The Health Care Quadrilemma: An Essay on Technology Change, Insurance, Quality of Care and Cost Containment." *Journal of Economic Literature* 29: 523-52.

Zeckhauser, R.J. 1970. "Medical Insurance: A Case Study of Trade-off Between Risk-Spreading and Appropriate Incentives." *Journal of Economic Theory* 2: 10-26.