The Health Sector's Share of the Gross National Product

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Between 1947 and 1987 expenditures for health care in the United States grew 2.5 percent per annum faster than expenditures for other goods and services. The health sector's share of the gross national product rose from well under 5 percent in the late 1940s to more than 11 percent in the late 1980s. The expenditures gap has two components: health care prices rose 1.6 percent per annum more rapidly than other prices, while the quantity of health care grew 0.9 percent per annum faster than other quantities. Many factors, including wages, productivity, technology, and insurance contributed to these trends. No single explanation suffices, and no simple solution is apparent.

THE HEALTH SECTOR'S SHARE (*1*) OF THE GROSS NATIONAL product (GNP) is a subject of intense interest to government officials, health professionals, business managers, and many others. The story of its rise from well under 5% in the late 1940s to more than 11% in the late 1980s is a familiar one, although there is no consensus concerning the relative importance of technology, health insurance, demography, and other factors in this expansion. The health sector's share in other countries is substantially lower (for example, under 9% in Canada and under 7% in the United Kingdom) even though they have universal insurance (*2*). Currently, many observers expect the U.S. share to reach 15 or 20% within a few decades. Such growth would increase the possibility of delivering high-tech state-of-the-art medicine to all Americans, including the one in seven who currently has no health insurance. On the other hand, it would exacerbate the diversion of resources from other pressing needs such as child care, education, the environment, housing, and transportation.

In the course of economic development it is customary for individual sectors to experience spurts of expansion that exceed the national average (automobiles in the 1920s, for example, and computers in the 1970s and 1980s). Such growth industries are usually lauded for their contribution to the overall performance of the economy. The increase in health care expenditures, however, requires special attention because widespread third-party payment removes the market constraints that discipline spending for most other goods and services (*3*). The purchaser of an automobile or a computer typically must weigh its cost against its potential benefit, but an insured patient tends to disregard or undervalue cost in making decisions about the use of health care (*4*).

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There is also widespread concern that the "spurt" of health care has continued for more than 40 years and shows little sign of abatement. Moreover, because the health sector is so large in absolute terms (about $600 billion in 1989), its rapid growth has a particularly traumatic effect on other sectors that compete with it for private and public spending. In this article I review the factors that influence the health sector's share of GNP and consider possible future trends.

The Gap

What percentage of GNP will the health sector account for 10 or 20 years from now? Given the present share (S_0) of approximately 11.5%, the share n years in the future (S_n) will be determined entirely by the gap (g) between the rate of growth of health expenditures and the rate of growth of expenditures in the rest of the economy, that is

$$S_n = \frac{e^{gn}S_0}{e^{gn}S_0 + (1 - S_0)}$$

Table 1 shows the health sector's share at various points in the future for various values of g. We see that if the gap is 1.5% per annum the share will rise to 13.2% in 10 years, whereas a gap of 3.0% will result in almost 15% of the GNP being devoted to health care. The further out the projection, the greater the effect of differences in the gap. After 25 years a gap of 1.5% per annum results in a 15.9% share, but if the gap is 3.0% per annum the health sector will account for almost 22% of GNP.

What gap can reasonably be expected? No one can say for certain, but the experience since World War II, summarized in Table 2, provides some evidence concerning the range of possibilities. We see that the gap averaged 2.5% per annum between 1947 and 1987; it was smaller in the first two decades, but exceeded 3.0% per annum from 1967 to 1987 (*5*). In contrast to the United States, 15 European OECD countries during the 1970 to 1987 span showed a median gap of only 1.8% per annum (*6*).

Because expenditures are equal to the product of prices and quantities, the gap can be partitioned into two components (Table 2). The first shows the rate of change of health care prices relative to prices of other commodities; the second shows the rate of change of health care quantities relative to the quantities of other commodities. In principle, the quantity of health services refers to the aggregation of all visits, tests, days in hospital, and other services delivered to patients. Greater intensity is treated as greater quantity—for example, a day in an intensive care unit is more quantity than a day in an ordinary hospital ward and a visit to a gastroenterologist is more quantity than a visit to a general practitioner. In practice, the

Table 1. The health sector's percentage of GNP in future years for selected values of g (initial share = 11.5%); g is the difference between the rate of growth of the health sector and the rate for the rest of the economy.

g (% per annum)	Years in future			
	10	15	20	25
1.5	13.1	14.0	14.9	15.9
2.0	13.7	14.9	16.2	17.6
2.5	14.3	15.9	17.6	19.5
3.0	14.9	16.9	19.1	21.6

quantity series are derived by dividing expenditures by prices. Thus, any error in the measurement of trends in relative prices results in an equal but opposite error in the relative quantities trend.

For the period as a whole the more rapid rise of health care prices accounted for almost two-thirds of the gap and the change in relative quantities for a bit more than one-third. This is a statistical decomposition, not a behavioral explanation. According to general equilibrium theory, prices and quantities of health care and other commodities are all interrelated, and determined simultaneously within a demand and supply framework. Also, although there is considerable confidence in the accuracy of the expenditure series, the official price indexes for health care and other commodities are subject to many possible sources of error. For instance, the timing and method of introduction of new goods and services into the indexes, the difficulty of accounting for changes in quality, and the problems of dealing with discounts present formidable obstacles to the accurate assessment of changes in price (*7*). These limitations apply not only to health care but also to computers, financial services, air transportation, and many other sectors with rapid changes in products or pricing policies.

Relative Prices

Apart from measurement error, the more rapid increase of health care prices can have only two possible explanations: (i) the prices of inputs into health care (that is, labor, capital, intermediate goods, and services) have increased more rapidly than input prices in other sectors, or (ii) productivity in health care has increased less rapidly than in other sectors (*8*).

Input prices. Labor is the most important input in health care and many other industries. During the period under study, the price of labor rose faster in the health sector than in the rest of the economy, thus contributing to the increase in relative prices of output. In 1949, rank-and-file health care workers (16 years of schooling or less) earned 15% less than their counterparts in the rest of the economy. In 1985 they earned 7% more than other workers (*9*). This implies that relative wages rose at the rate of 0.6% per annum. The rate of change of physicians' incomes over this period cannot be calculated because there are no reliable estimates for the early years. But even if physicians' incomes did not rise as rapidly as other health care workers (between 1977 and 1987 they rose more rapidly), the differential trend in the price of labor must have contributed several tenths of a percent per annum to the long-term differential in relative prices.

From 1977 to 1987, wages in most industries failed to keep pace with inflation, but rank-and-file health workers did better, outpacing employees in the rest of the economy by 1.3% per annum (*10*). The net income of physicians (adjusted for changes in specialty mix) grew even faster, rising by 8.1% per annum compared with only 5.5% per annum for all private nonagricultural workers (*11, 12*). This above-average growth of the price of labor in health care was undoubtedly a significant factor in the rapid rise of relative prices in the most recent decade.

The prices of most other inputs, such as goods and services purchased form other industries, tend to rise at about the same rate for health care as for the rest of the economy. If, however, there are inputs that have particularly rapid price increases and loom disproportionately large in the production of health care, the effect will be to increase health care input costs relative to the rest of the economy. An example of this phenomenon is malpractice insurance (*13*). The rapid growth in the number of tort claims and the size of damage awards has affected liability premiums in all industries, but the impact is greater on health care than other areas because liability insurance represents a larger proportion of total costs. Even in health care, however, malpractice premiums are, on average, under 2% of total costs; therefore, the effect on relative prices must be small. The malpractice claim problem has other potential effects, however, on productivity and on the quantity of services.

Productivity. It is important to realize that conventional measures of health care productivity do not take account of the effects of care on health any more than productivity in agriculture depends on whether tobacco or oat bran is better for health. Agricultural productivity is measured by the outputs of tobacco, grain, milk, and the like relative to the labor, land, and other inputs required to produce them. In principle, productivity of the health care sector is

Table 2. Rates of growth of the health sector and the rest of the economy, selected periods, 1947–1987 (percent per annum) (*22–25*). Rates are calculated from 3-year averages centered on the year indicated (except for 1947 and 1987).

Factor	1947–1987	1947–1967	1967–1987	1947–1957	1957–1967	1967–1977	1977–1987
Expenditures							
1. Health care	9.7	8.2	11.3	7.6	8.7	11.8	10.8
2. Rest of the economy	7.2	6.2	8.2	6.4	6.0	8.6	7.8
Prices							
3. Health care	5.7	3.7	7.6	3.7	3.6	7.1	8.3
4. Rest of the economy	4.1	2.4	5.8	2.7	2.0	6.2	5.3
Quantities*							
5. Health care	4.1	4.5	3.7	3.8	5.2	4.8	2.5
6. Rest of the economy	3.2	3.8	2.5	3.6	4.0	2.4	2.5
The gap (g)*							
1 minus 2	2.5	2.0	3.1	1.2	2.7	3.2	2.9
Relative prices*							
3 minus 4	1.6	1.3	1.9	1.0	1.6	0.8	3.0
Relative quantities*							
5 minus 6	0.9	0.7	1.2	0.2	1.2	2.4	0.0

*Calculated from unrounded data.

similarly measured by an aggregation of physicians' visits, hospital days, tests, and other services relative to inputs, independently of any judgment regarding the effectiveness of those services for health.

Much of the growth of health care prices relative to the rest of the economy between 1947 and 1987 is probably the result of differential changes in productivity, so measured. It is well known that productivity growth in services is slower than in agriculture or industry (*14, 15*), and health care is no exception. In general, industries such as health and education that depend heavily on individualized personal contact have not been able to achieve the productivity gains realized in other industries by the routinization of production and the substitution of capital for labor.

Evidence of substantial differentials in labor productivity growth comes from the trends in employment. Between 1950 and 1987 the number of persons working in the health sector grew 2.6% per annum more rapidly than in the rest of the economy (4.3% compared to 1.7% per annum) (*16*). This stands in sharp contrast to the differential trend in relative quantities during that period of approximately 1.0% per annum. The rest of the economy achieved some of its gains by substituting capital for labor; thus the differential trend in total factor productivity was smaller than for labor productivity alone. It could, however, still be large enough to account for most of the trend in relative prices.

The malpractice claim problem may have contributed to the productivity shortfall in health care in the following way. As physicians and other health professionals become more aware of the need to be able to defend against malpractice suits, they begin to keep more extensive records. This requires more time input on their part and on the part of other workers, but does not show up as any increase in quantity of output. Another possible development is that physicians may spend more time with each patient on each visit; unless they make an explicit charge for the additional time, it will not be reflected in the quantity index. To the extent that concern about malpractice claims leads physicians to order more visits or more tests, these changes will show up in the quantity index and do not adversely affect productivity as conventionally measured.

The rapid changes in financing and marketing of health care in recent years may also have contributed to poor productivity performance. Physicians and hospitals now face a bewildering array of insurance plans and they presumably require substantial numbers of clerical personnel to handle the large volume of paperwork. Also, as hospitals and physicians have tried to adapt to the so-called "competition revolution" of the 1980s, there has been a considerable increase in resources going into marketing, advertising, new computer systems, management consulting, and the like. It is doubtful that these additional inputs resulted in an equivalent increase in quantity of care. Whether these additional inputs required by hospitals and physicians to adapt to changes in health care finance are "one time" or will continue in the years ahead is not known.

Relative Quantities of Output

The possible explanations for the trends in relative quantities of output are more numerous and their interrelationships more complex than for relative prices. The variables that have been mentioned most frequently to explain why use of health care has grown faster than that of other goods and services include "defensive medicine," the aging of the population, new technologies, and the rise of "third party" payment.

Defensive medicine. When physicians order tests or other services in order to protect against charges of malpractice, rather than because they believe those services to be of value to their patients, they are practicing "defensive medicine." According to some commentators, the rise of defensive medicine is a major factor in the expansion of medical care, but the evidence is anecdotal and there are reasons to question the importance of this explanation. One reason for doubt is that the malpractice claim problem has grown much more rapidly in some areas of the country than in others (for example, in California versus Mississippi), but the rate of expansion of health care is more uniform across areas. The timing of change is also problematic. Defensive medicine should have grown most rapidly in the past decade in response to the prior surge in malpractice claims, but as Table 2 shows, there was a slower growth of the quantity of health care between 1977 and 1987 than in any of the three previous decades. Indeed, in the most recent decade the quantity of health care (that is, number of hospital days, physician visits, and the like) has not grown any more rapidly than quantity (that is, number of automobiles, airplane trips, and the like) in the rest of the economy. If defensive medicine was such a powerful force toward increased use, why has it not resulted in more hospital admissions or longer hospital stays in recent years? Recent changes in the reimbursement policies of Medicare, state governments, and private insurance companies seem to have been more powerful, resulting in fewer admissions and shorter stays.

The regional and time trend evidence, however, is far from conclusive. One could argue that in the absence of the growth of defensive medicine, the cost containment efforts of recent years would have resulted in even more slowing in the growth of quantity of care. One way to think about the problem is to pose the following hypothetical question: "If new national legislation outlawed all future malpractice claims, by how much would physicians and hospitals voluntarily cut their present revenues?" Those who assume that defensive medicine is a big part of the cost problem presumably think that those cuts would be very large. Alternatively, physicians and hospitals might find other reasons for providing something close to the present volume of services as long as facilities, equipment, and personnel are available and there is insurance to pay for them.

Aging of the population. The use of health care varies greatly with age; among adults the pattern is one of sharp increases with increasing age. Under the assumption that the cross-sectional age-spending relation holds constant over time, the effect of the change in the age distribution of the population is estimated by applying the cross-sectional data to the change in the age distribution. One such calculation made with age-specific expenditure patterns in 1978 showed that the change in the age distribution of the population between 1946 and 1986 would have resulted in an increase in use of health care of approximately 0.3% per annum (*17*).

Although this method of estimating the effect of demographic change is widely used, it is problematic. If the change in the age distribution is the result of falling age-specific death rates, the age-expenditure pattern may change over time. One of the main reasons why health care spending rises with age is that the proportion of persons near death increases with age, and expenditures are particularly large in the last year of life. Almost 30% of all Medicare expenditures are devoted to the 6% of enrollees who are in the last year of life (*18*). When age-specific death rates fall over time, there are fewer people in the last year of life at any age; thus their expenditures may be less than those predicted from a previous age-spending pattern. On the other hand, because their life expectancy is greater, they may be deemed suitable candidates for more medical care than previous cohorts at their age.

More certain than the effect of the change in the age distribution is the fact that use of health care by the elderly has grown more rapidly than the rate of use by the population below age 65. For the period from 1965 to 1981, the differential trend on a per capita basis was 1.5% per annum, and for the period 1976 to 1981, it was 2.3%

per annum (*19*). Increased spending for physicians' services by the elderly have been particularly rapid in recent years.

What accounts for the differential trends by age? For the years immediately following 1965, Medicare is a sufficient answer; millions of elderly patients suddenly had much better access to care. But the surge in spending after 1976 requires additional explanation. One possibility is that increasing competition among physicians for patients led them to devote more attention to the older men and women in their practices. Also, new medical and surgical interventions may have been particularly applicable to older persons. A third possibility is that improving health of the elderly population made them better candidates for extensive (and expensive) surgical interventions, interventions that would not have been medically justified if the patients were in poor health. These diverse speculations suggest why it is so difficult to find a simple explanation for trends in use.

Technology. Technologic innovation is the primary engine of economic progress. Some innovations are institutional or organizational in character, for example, double-entry bookkeeping, the limited liability corporation, or prepaid group practice of medicine; some take a tangible form. Innovations in medical care, as in other fields, may appear as new "products" such as new operations or new drugs or as new "processes" (such as automated blood tests) which enable health professionals to continue doing what they have been doing, but at a lower cost. Most new health care technology involves a change in product rather than process, although the distinction is not always clear-cut (for example, a new diagnostic procedure may be viewed as a change in product or process). Most observers assert that expansion in the character and scope of interventions that physicians can undertake has been a major factor in the growth of health care quantity in recent decades. It must not be assumed, however, that this need always be the case. During the late 1940s and 1950s, the most important technologic advance in medicine, antibiotic drugs, sharply reduced the average length of stay in hospital. Between 1947 and 1957, a period of great advances in medicine, the quantity of health care grew at only about the same rate as the rest of the economy.

This experience should serve as a warning against a blanket indictment of technology as cost-enhancing. The character of innovation needs to be considered as well as its magnitude. It is also important to avoid the naïve view that innovations are completely exogenous to the health care system—that is, that they are the inevitable by-products of advances in scientific knowledge. Science plays an important role, to be sure, but the character and magnitude of innovations in any particular sector are partly endogenous, that is, determined by demand emanating from the sector. The third party cost-based reimbursement system that evolved in the United States in recent decades tended to encourage any innovation that promised to improve the quality of care, regardless of cost. Manufacturers of drugs, equipment, and supplies contemplating investment in the development of such innovations did not have to worry about whether the prospective improvement was worth the increase in cost (*20*). Moreover, there is an important distinction between potential technology (that is, knowledge of available technology) and technology actually in place. The technology frontier is the same in Great Britain as it is in the United States, but expenditures for health care are much lower in Britain, in part because many technologic innovations are not as readily available to British physicians and patients.

Third party payment. Fueling the rapid diffusion of new health care technologies, the huge expansion in utilization by the elderly, and the growth of defensive medicine, is the pervasive influence of third party payment. Without the hundreds of billions of dollars available through private and public health insurance, it seems unlikely that the health sector would have grown at anything close to its actual rate. In the early years after World War II the expansion was primarily in private health insurance. Between 1945 and 1960, for instance, the number of persons with hospital insurance jumped from 32 to 122 million, and the number with insurance for physicians' services soared from fewer than 5 million to more than 83 million (*21*). The passage of Medicare and Medicaid legislation in 1965 brought health insurance coverage to additional millions of Americans among the elderly and the poor who had not been well served by the private system.

The spread of insurance, however, does not provide a completely satisfactory explanation for all the trends. It doubtlessly contributed to the rapid expansion of health care quantity in the decade or so after 1965, but if insurance alone determined utilization, the relatively flat growth in relative quantities from 1947 to 1957 would be inexplicable. Moreover, during the 1980s insurance continued to be widespread, but both private and public payers introduced new methods of finance and reimbursement in an attempt to stem escalating costs. Medicare's prospective payment system based on diagnosis-related groups (DRGs), the state of California's hospital-specific contracts for Medi-Cal patients, the expansion of deductibles and coinsurance in private insurance plans, the development of many new health maintenance organizations (HMOs), and preferred provider organizations (PPOs) were all designed to curb use and hold down prices. The results have been spotty: more success with hospitals than with physicians' services; more success with quantities than with prices. Overall, the gap has persisted at nearly 3% per annum since 1977.

Other factors. The decline of the family and traditional religion and the surge of women into paid employment have undoubtedly contributed to an increase in the quantity of health care as recorded in the GNP accounts. The explosion in nursing home care, for instance, which now accounts for almost 1% of the GNP, illustrates how social trends can contribute to a switch from home to market production of health services.

More controversial is the question whether the doubling of the ratio of physicians to population since World War II increased the demand for health care. According to standard economic theory it could not; supply and demand are independent except through changes in price. Many economists argue that health care markets conform to this model. Others, however, claim that patient information concerning the need for care is sufficiently imperfect that physicians can induce shifts in demand and are more likely to do so when supply is relatively great.

Future Prospects

This brief review of past trends shows how the expenditures gap can result from the interplay of many factors, and that there is little prospect of eliminating or substantially reducing it by trying to identify a single cause. Indeed, in addition to the socioeconomic variables considered here, biological changes can play a role, as evidenced by the AIDS epidemic. Regardless of cause, however, it is clear that political pressures to contain the gap are building. These pressures arise within government because of the large role of health expenditures in the federal budget. They also come from industry and labor, who fear the impact of mounting health insurance premiums on their balance sheets and wage settlements. Sometime during the next decade the government is likely to launch a major assault designed to bring the rate of growth of health care expenditures closer to the rate of growth of the rest of the economy. This will require attention to both price and quantity.

One likely target for restraining input prices is the income of

physicians. Such income outpaced the growth of wages in general during the past decade, but may lag behind in the next. Restraining the earnings of other health care workers is likely to prove more difficult, as may be inferred from current discussions about a nursing shortage. As employment opportunities for women expand in other industries, the health sector's disproportionate dependence on women (75% compared to 40% for the rest of the economy) implies continued pressure for it to increase wages to attract and hold its labor force.

Attempts to lower other input prices such as for drugs, equipment, and supplies, should also be expected. Federal and state governments, insurance companies, and other large payers are likely to use their massive buying power to attack any monopoly profits that are present in the current pricing policies of firms that supply the health care industry.

Increases in productivity may be sought in several directions. A large one-time gain might be achieved by simplifying our system of finance and reimbursement. This is one area where Canada, for instance, probably has a large advantage over the United States. Canadian physicians bill only one payer (the provincial government), and hospitals do not have to bill at all; they are paid according to a global annual budget. Additional gains could come from holding down the number of physician specialists and subspecialists, thus ensuring fuller work loads for those remaining in practice. The present level of demand leaves many physicians without a full work load in their specialty. The excess supply does not drive down fees, and even low work loads generate sufficient income to attract more new physicians into those specialties. Productivity gains may also be realized if cost containment efforts induce more process innovations and more widespread adoption of cost-reducing technologies by physicians and administrators.

Restraining quantity is likely to prove as difficult as restraining prices. The population will continue to age, and one projection shows an increase in quantity of 0.5% per annum simply as a result of the expected change in age distribution between 1986 and 2006 (*14*). Pressure to provide health insurance for the uninsured will also contribute to expanding quantity. And we can expect increased demand for health professionals to provide services for persons with emotional disorders, marital strife, addictions, and other problems that in an earlier time might have been approached within families or religious communities. One favorable development is the increased attention to technology assessment that may result in discontinuance of ineffective procedures.

Many policy experts look to financial pressures on patients as the principal way of restraining quantity. By introducing more deductibles and coinsurance, and by gearing insurance premiums more closely to expected use, they hope to restrain the demand for care. This approach does reduce demand, but it is likely to encounter substantial difficulties. Most people do not want to risk having to pay very large bills so they seek health insurance, either privately or through government programs. Despite all the efforts to introduce deductibles and coinsurance in the 1980s, the fraction of health care expenditures paid for directly by patients was no larger in 1987 than in 1983 (*17*).

The present enthusiasm for "experience rating," that is, the adjustment of insurance premiums for individuals and firms according to their use, is also likely to dissipate. Most Americans feel comfortable about having cigarette smokers pay higher premiums than nonsmokers, but even enthusiastic advocates of experience rating are uneasy about requiring individuals born with genetic defects to pay above-normal premiums. Where should the line be drawn, and who will draw it? Is alcoholism, for instance, to be regarded as similar to cigarette smoking, or is it more analogous to a genetic disease? One probable consequence of genetics research is to make people more aware that there is a genetic component in most diseases. Thus political sentiment is likely to swing back toward an acceptance of collective responsibility for the health care needs of individuals.

More enduring constraints on quantity are likely to emerge from the supply side rather than from demand. The debate over whether or not to ration care is largely irrelevant; the important questions are: Who will ration? Who will be rationed? What will be rationed? There are likely to be attempts to hold down the growth in number of physicians, to limit expansion of medical care facilities and equipment, and to monitor closely the pace and character of technologic innovation. One can only hope that these attempts will be guided by rational analysis, compassion, and an appreciation for the long-run as well as short-run aspects of this complex problem.

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