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The Economics of Health Care in Japan

Naoki Ikegami

Japan's health care system balances universal coverage at reasonable cost. The government has taken on the responsibility of acting as insurer and subsidizing health care spending for the employees of small enterprises and the self-employed. Despite the fee-for-service form of payment, costs have been contained by the use of a nationally uniform fee schedule that is mandatory for all providers. However, the increasingly affluent and aging population is making new demands on the system that can only be met by a major restructuring.

By broad measures of performance, Japan's health care system appears to have achieved a paragon of success. The gross health indicies are the best in the world: the infant mortality rate is 0.46% of live births and the life expectancy at birth is 75.9 for males and 81.8 for females (*1*). There is universal coverage with virtually unlimited access to all health care facilities by every citizen. Moreover, because Japan's per capita rates of computer-aided tomography (CAT) scans and patients undergoing renal dialysis are among the highest of all nations, there would seem to be no overt signs of rationing (*2*). What makes this record even more impressive is that the ratio of the gross domestic product (GDP) devoted to health care is 6.8%, little more than half the ratio of the United States (*3*).

In this article, I briefly describe how the Japanese health care system works to provide some general context for international comparison (*4*). Is Japan's system really a paragon? In particular, how is equity achieved? Why has it been possible to contain costs under a fee-for-service system? Are there any negative effects coming from cost containment? What are the relations between cost, access, and quality?

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The Delivery System: Functionally Undifferentiated

About 81% of Japan's hospitals and 94% of its physicians' offices (referred to as clinics) are privately operated (*5*). Although hospital beds have recently become regulated, there are still no restrictions on any other form of capital investment. However, this entrepreneurism has been permitted only by private practitioners. Investor-owned hospitals that are operated for profit are prohibited, and the hospital's chief executive must always be a physician. These legal limitations have effectively constrained the development of multihospital systems. Most of the hospitals are small, physician-owned family concerns that have developed from clinics. Few of them have ventured into high technology medicine because of the restraints posed by the financing system, so that this area tends to be dominated by the smaller but more prestigious public sector.

Health care in Japan differs from the United States in that the physicians in clinics do not have any access to hospital facilities and must refer all patients needing care that they cannot provide within their own premises. On the other hand, hospitals employ their physicians on fixed salaries and maintain large outpatient departments from which they admit all their inpatients. Because of this mutually exclusive arrangement, both clinics and hospitals compete for patients, who have freedom to choose the facility that they feel best fits their needs. This situation means that there is little functional differentiation between clinics and hospitals, and their boundary is further blurred because a third of the clinics have a small number of beds (the distinction is primarily legal in that facilities with more than 20 beds are designated as hospitals, whereas those having fewer than 20 are called clinics). Neither is there much differentiation between acute and long-term care. Hospitals have taken on the function of nursing homes in Japan, and 45% of the inpatients over the age of 65 have been hospitalized for more than 6 months (*6*).

The Financing System: Strictly Regulated

In contrast to the basically laissez-faire policy taken toward the delivery system, the financing system is highly regulated. First, although there are multiple payers, consumers have virtually no choice over the selection of their plan. They must join the one statutory plan offered by their employers, or if they are self-employed, that administered by their local governments or trade associations. However, the lack of choice does not really affect the consumer because there is little flexibility. All plans offer basically the same set of comprehensive medical benefits, including medications, long-term care, dental care, and some preventive care.

Second, neither insurers nor providers have the freedom to negotiate individually a different fee schedule. The fee-for-service system operates under a minutely defined price schedule set by the government. All providers are paid exactly the same amount, inclusive of physician's fees, for the same service regardless of the physician's expertise or the facility's characteristics or geographical location.

Third, consumers cannot opt out of the statutory system, and private health insurance, which is mainly limited to cash compensations to cover incidental expenses during hospitalizations, remains insignificant. Providers are strictly prohibited from balance billing (charging more than the fee schedule allows). Extra charges are permitted only for private hospital rooms [only 10% of the rooms are of this status in Japan (*7*)] and a very restrictive range of new technology, which is still being evaluated.

The insurance plans (Table 1) can be broadly divided into two categories. First is the insurance system for employees and their dependents, in which the premiums are generally paid on an equal basis between

Table 1. Status of health insurance plans in Japan in 1991 (*22*).

Sector	Health plan	Population covered
Employees	Government Managed Health Insurance	28.9%
	Society Managed Health Insurance	25.5
	Day Laborers' Health Insurance	0.1
	Seamen's Insurance	0.4
	Mutual Aid Associations Insurance	9.7
	Total	64.6
Self-employed and pensioners	National Health Insurance (NHI)	32.1
	NHI associations	3.3
	Total	35.4
Total		100.0

employer and employee. Together this amounts to about 8.2% of the average monthly wage and is automatically deducted from the paycheck as a Social Security payment. However, because contributions are not made from or are far less than the biannual bonus, which typically totals a third of the employee's annual income, premiums amount to only 2.7% of the average employee's total income (*8*). This system of employer-based insurance can be subdivided into five segments: (i) Government Managed Social Insurance for workers in small enterprises of more than five but fewer than 300 employees; (ii) Society Managed Health Insurance (jointly managed by management and labor representatives) for workers in large enterprises (numbering 1800 societies); (iii) the Day Laborers' Insurance (those expected to work for less than 2 months); (iv) the independent Seamen's Insurance; and (v) the Mutual Aid Association Insurance for public-sector employees. For all plans under this system, the copayment rate is 10% for employees and, for dependents, 20% for inpatient care and 30% for outpatient care.

Second is the insurance system for the self-employed, pensioners, and their dependents. The elderly would be covered by this system unless they are employed or their low income makes them eligible for coverage by their children as dependents. Premiums are calculated on the basis of income, the number of individuals in the insured household, and assets. This category can be divided into the community-based ordinary National Health Insurance (NHI) in which the municipal government acts as insurer, and the NHI associations, which insure members in the same occupation, such as carpenters or barbers. Under this system, the copayment rate is 30% for both inpatient and outpatient care.

Except for the 0.6% of the population on public assistance for health care (9), all Japanese are mandatorily covered by one of these plans. The employer-based plans cover 65% of the population, whereas the plans for the self-employed and their dependents cover the remaining population. The copayment is waived for all the elderly aged 70 and older (65 and older for those bedridden), who have to pay only a nominal amount when receiving health care.

How Equity is Achieved

Equity is maintained because the regulations described above do not allow providers or insurers the freedom to negotiate for more favorable arrangements regarding cost or quality. The inequities in copayment rates are largely mitigated by the provision that any out-of-pocket copayment faced by a patient in a given month over the amount of 60,000 yen ($480) [or 33,600 yen ($267) for those with low income] is reimbursed regardless of the plan. Thus, out-of-pocket expenses for copayments amount to only 12% of the total health care expenditure provided under social insurance (*10*). According to a 1988 survey conducted in Tokyo, neither the utilization rate nor the health care expenditure per person was affected by an individual's income level (*11*). In a national survey in 1985 of those who had experienced an illness but had not seen a physician, only 0.4% gave economic reasons for not having done so (*12*).

How has it been possible to realize an equitable system within the framework of multiple payers? Even if regulations mandate a uniform fee schedule, plans insuring those with low income would find it difficult to balance their expenditure with their revenue from premiums. The answer lies primarily in that the government takes on the responsibility by providing subsidies and managing these plans. In the National Health Insurance, which is the insurer for the self-employed and pensioners who tend to be at most risk and have the lowest level of income, the local government acts as the insurer, and the central government provides a direct subsidy amounting to half of total expenditures. For those employed in small enterprises and day laborers, the insurer is the central government, which also provides a subsidy amounting to 14% of total expenditure.

The most expensive component of health care, geriatric care, is paid for by contributions to the pooling fund created by the Geriatric Health Act in 1982, which pays for all health care costs incurred by the elderly, regardless of plan. To this pooling fund, each plan must contribute a sum that would have been paid for the health spending of the elderly insured in their plan, but this amount is standardized, so that the plan's ratio of the elderly would become equivalent to the ratio of the whole country. Thus, no plan is penalized or rewarded by the ratio of the elderly it has insured, and the burden becomes equitably redistributed. In addition, the central and local governments contribute 20% and 10%, respectively, of the pooling fund's total expenditure.

The present level of equity was achieved through a slow process that began by extending the population insured and then by leveling the inequities between the plans. Health insurance in Japan was first made available in 1927 for manual workers employed in large companies by establishing Insurance Societies. Insurance premiums were paid on an equal basis by employer and employee, but there were no copayments. The government took the lead in introducing this plan, believing that it would contribute to the nation's wealth by providing healthy and productive workers and also would preempt the socialist movement. Thus, the benefits focused on the ambulatory care of acute illness and injury, while nursing care continued to be provided by the family. This system was extended to all manual workers belonging to enterprises employing five or more persons in 1935 and to white-collar workers in 1940. A community-based insurance (the precursor of the NHI), which paid half the costs for the self-employed, was first legislated in 1938. The worker's dependents became covered for half their costs in 1940. This rapid expansion owes much to the increasingly strong voice of the army and the need for more healthy soldiers in the war with China (*13*).

Although defeat in World War II nearly destroyed the system, it was rapidly rebuilt as a result of a new commitment to establish a welfare state. Under Article 25 of the new constitution enforced since 1947, the government has the responsibility to provide an adequate minimum for realizing a healthy and culturally enriching life. A combination of government subsidies and legislation finally led to universal coverage in 1961, when the last local governments became insurers for their NHI. The subsequent years have witnessed greater equality among the plans. The copayment was decreased from 50 to 30% for the NHI in

1968, and for the dependents of the employee-based plans, it was decreased to 20% for inpatient care and 30% for outpatient care in 1973. Also, in 1973 the system of reimbursing copayments above a certain amount was initiated for all plans, and all copayments were waived for the elderly. The recent pressures for cost containment have paradoxically led to a positive effect on equity; in 1984, copayments were introduced for the first time for those employed.

The development of health insurance in Japan shows how systems can be adopted and later changed to suit the country's policy needs. The concept of social insurance came straight from Bismarck's model. However, while in Germany the sickness funds have maintained their autonomy and the people may opt to choose private insurance, the Japanese system has become far more uniform and egalitarian as a result of mandating conformity to the national fee schedule as a precondition for receiving subsidies and the system of cross-subsidization for financing geriatric care.

Existing Inequities

Although the government's role in providing subsidies has narrowed the inequities among the plans, some still do exist. That premium and copayment rates differ between the employee-based plans and the NHI has drawn much attention in Japan. However, although the income of the employed is well disclosed, that of the self-employed is difficult to estimate, so that the differences in burden may not be as great as they first appear. Therefore, to control for these factors, I focus on the differences among the societies in the Society Managed Health Insurance, which insures those employed in large companies. First for the cost side, the total premium rate varies from 5.8 to 9.5% between the highest and lowest Insurance Societies. This difference is closely related to average age of the employees. Thus, declining industries such as coal mining, which have an older work force, have to pay higher premiums. Also in industries where the average wage is low, such as textiles, the premium rate is high, although the absolute premium amount is low. This difference reflects the situation that health care utilization is income inelastic in Japan.

With regards to benefits, individual Insurance Societies can exercise their initiative in three areas. The first is the ratio of premiums paid by employers, which varies from 50 to 80% with a mean of 56.7%. The second is the ratio allocated to health screening and promotion, which varies from 3.1 to 8.4% of the total expenditure with a mean of 6.6%. The third is the ratio allocated to additional benefits, consisting mainly of the reimbursement of the patient's copayment. This varies from 0 to 4.4% with a mean of 2.9% (*14*).

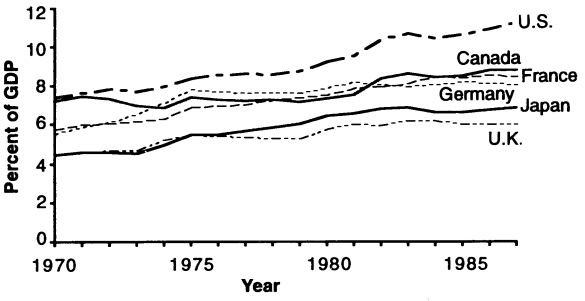

Fig. 1. Total health expenditures (*3*) as a percent of gross domestic product (GDP) in selected countries from 1970 to 1987. U.K., United Kingdom; U.S., United States.

These inequities have not aroused much public attention because they are essentially marginal. As noted above, insurers cannot negotiate over the main benefits because they are strictly controlled by the uniform fee schedule. Moreover, these differences have been historically decided and have rarely been subject to serious negotiations between management and labor. But if one regards equity in health care to be paramount, then the whole system of multiple payers must be dismantled in favor of a single payer, as has been advocated by the Japan Medical Association. On the other hand, if health care is to be regarded at least partially as a private good, then some degree of flexibility should be allowed. Indeed, it could be argued that the present system is too rigid. The strict regulations have resulted in a small but significant black market for patients wishing to gain access to eminent specialists. This takes the form of a monetary gift to the attending physician in the range of 100,000 to 300,000 yen ($800 to $2400) but is usually limited to patients hospitalized in the private rooms of universities and other prestigious hospitals. The other area where extra payment is made despite official prohibition is in geriatric hospitals. The providers have argued that they are charging for nonprofessional nursing care and diapers and so forth that are not covered or are inadequately covered by the insurance (*15*).

Mechanism for Cost Containment

The reason why so much attention has been focused on equity is that Japan has been able to contain costs because the system has been basically equitable. Under a single-tier system, people's expectations do not become inflated to the level that the most affluent are willing to pay for their health care. More specifically, the uniform fee schedule acts as the primary mechanism for cost containment because it implicitly establishes both the scope and standard of services that can be provided. As has been mentioned, neither providers nor payers can individually negotiate to expand benefits; any such decision must be made by the government. Because any expansion of services or price increase would be applied for all insurers, the government has a strong incentive to constrain the growth of total health expenditures. The incentive derives from the relation that an increase in total health expenditures will automatically lead to increases in the government subsidies because the plans are subsidized at a fixed rate.

Rigorous control over the price and scope of services has been maintained especially since the 1980s as a result of the government's commitment to contain overall public expenditures. In addition to limiting the increase of fees for procedures to a bare minimum, the price of pharmaceuticals has been more than halved and that of laboratory tests decreased by bundling. As Fig. 1 shows, these measures have been relatively successful. Japan's ratio of health care expenditure to its GDP rose as rapidly as in the other countries in the 1970s, but has leveled off in the 1980s, in marked contrast to the case in the United States. Although the ratios in Canada and West Germany have also leveled, these countries started off from a far higher share. Thus, with the exception of the United Kingdom, Japan has the lowest ratio among the developed countries.

The actual negotiations for the revisions in the fee schedule take place in the Central Social Medical Care Council of the Ministry of Health and Welfare. The council comprises eight representatives from providers (five physicians, two dentists, and one pharmacist), eight from payers (four from insurers, which includes two from the government, and two each from management and labor), and four who represent public interests (three economists and one lawyer). The estimated allowable increase in the total health care expenditure is first decided. This total increase is theoretically based on the periodic survey made every second year on the financial state of hospitals and clinics (the latter being equivalent to a study on physicians' income). However, in effect, it is virtually decided by the Ministry of Finance because the government's subsidies must be kept within the general budgetary limits. After this amount has been settled, the price revision for each

individual item is decided by negotiations among the providers. The net effect of revising the price of each item to the already decided total increase in expenditure is calculated by multiplying the change in each item by its volume as estimated from the national survey of claims data.

How has it been possible to achieve cost containment when only the price is controlled? If prices are regulated, then volume usually expands. The reason why this has not occurred to the extent that it would invalidate the estimated growth in expenditure can be ascribed to the following. First, some of the fees are set at such a low level that they would not pay for the provider's cost price. In general, hospitals tend to lose money on inpatient service, which they offset by gains on outpatient service. While it is true that hospitals combine the functions of nursing homes in Japan, the average cost per day, inclusive of all services, averages only 14,109 yen ($113) for inpatient care (including physician expenses). In contrast, the average for an outpatient visit is 5078 yen ($41) (*16*). There is no separate funding for financing capital investment except in the public sector. As a result, private hospitals have been inhibited from venturing into the field of high-technology medicine. The exceptions are renal dialysis and imaging equipment, the very areas in which Japan has the highest per capita number of instruments. In the case of renal dialysis, a policy decision was made to set initially a high price to speed its use by providers. In the case of imaging equipment, hospitals have felt the need to maintain a competitive position to attract patients and physicians. In addition, the costs of these technologies are relatively low when compared with surgical procedures because they are not labor intensive and domestic manufacturers have developed and aggressively marketed inexpensive models.

Second, there is the retrospective review of claims sent by providers. Detailed item-by-item claims of the services rendered must be sent by every institution at the beginning of each month to the intermediary payment funds that operate at the prefecture level. These claims are then inspected by the fund's designated panel of physicians. If the panel concludes that excessive numbers of procedures or drugs have been provided, then payment will be denied for those items. In addition, claims over the amount of 5 million yen ($38,462) are subjected to special reviews at the national level. The actual ratio of the claims judged as providing excessive care is less than 1%, but because these are concentrated on the high-cost claims, the review does have some effect. Also, the denials tend to have a sentinel effect on the provider because, should they gain a reputation for excessive services, their claims would in the future be subject to a more intense examination.

Is the System Really a Success?

It could be argued that the excellent health indicies and the low costs are a reflection of the lifestyle and economic conditions rather than the health care system. This argument may well be accurate but universal coverage without overt rationing is in itself a major achievement. The next question may well be, are Japanese health care costs really low? First, it could be argued that the calculation of health care costs has not been sufficiently standardized and, as a result, underestimates the Japanese costs. However, even if the ratio were increased by 10%, it would still be below that of the major industrialized countries. Second, the Japanese health care system may have been given a relatively easy task by society. There were only 473 reported cases of AIDS in Japan as of 30 April 1992 (*17*); the diet is low on fat and total calories; and while 12% of the population is over 65, some 57% of them still live with their children (*18*). However, no diet is perfect and too much salt has led to a high prevalence of stroke (*19*). Contrary to expectations, 6.2% of the elderly are in hospitals, nursing homes, and so forth (*20*), a percentage higher than in the United States. Third, Japan's economic growth may have masked the sharp increase in health care costs. While Japan had a very high growth in real per capita health care expenditure during 1960 to 1987, it started from a low baseline of $258 (purchasing power parity) in 1960 (*3*), and thus much of the increase could be regarded as a reflection of the growing affluence.

However, even if these caveats are not bothersome, Japan's method of achieving cost containment does have some serious intrinsic problems. First, there are limits to the fee scheduling approach, especially in the areas of prescribing drugs and ordering laboratory tests. These areas have been a major problem in Japan because most physicians in clinics do their own dispensing, and hospital-based doctors dispense from the institution's pharmacy. Also, laboratory tests are billed by hospitals and clinics even in cases where they are contracted out. Although periodic surveys of the market price are made by the government, and insurance prices are adjusted accordingly, providers continue to make a profit because competition leads to a new round of price cutting. The providers have maintained that they need this margin to offset the deficit coming from low hospitalization fees. This competition has not necessarily led to greater efficiency, however. Despite the downward trend in price, most pharmaceutical companies have managed to survive successfully by continuously introducing marginally improved high-priced products that are marketed as major innovations. It is for this reason that Japan's use of third-generation antibiotics is more extensive than anywhere else (*21*).

The second problem is the rigidity. Within the budgetary limits, both the content and the price are determined by political negotiations within the closed ranks of the providers rather than market forces. To minimize conflict, they have pursued an incremental policy of trying to maintain the preexisting relative share of each clinical specialty, and that between hospitals and clinics, and so forth. As a consequence, the share of the traditional ambulatory services, mainly in the field of primary care, has remained high compared to inpatient services and high-technology medicine. Although this situation has had a positive effect on cost containment, it has also proved difficult to introduce innovative service or to improve the amenity level of hospital services.

The third problem is quality. The price is uniform for all providers based on the assumption that their quality is the same. However, patients are increasingly turning to the university and large public hospitals because of their perceived higher quality. As a result, there are long queues for ambulatory visits and waiting lists for hospitalization. This situation is difficult to reverse because freedom of choice has been regarded as the cardinal principle in the delivery of care in Japan. One solution actively being advocated by the government and the Japan Medical Association is development of a referral system. However, clinics and hospitals have basically regarded each other as competitors rather than partners. Moreover, for the system to work effectively, both parties must evaluate the content and quality of their care. Such an evaluation requires information disclosure and a formal system of external audit, both of which are concepts foreign to the Japanese culture and especially so in health care.

No health care system is perfect because infinite demands must always be met with finite resources. On the criteria of cost, access, and quality, Japan has been relatively successful in the areas of cost and access. This is a remarkable accomplishment as it has been achieved despite the fee-for-service method of payment and the existence of multiple payers. However, while the benefits are essentially the same for all, the uniform fee schedule has served as a rationing mechanism less overt but more rigid than the British system. Because revisions in fees are made by political negotiations within the closed ranks of the stakeholders, the private practitioners providing ambulatory care have managed to maintain their

dominant position in the rationing process. However, new demands are being placed on the health care system. On one hand, there is demand for a higher level of professional quality by the increasingly affluent society. On the other hand, the aging population requires a network of care management and better facility standards. A major restructuring of the system is needed before this can be realized. The current concept of equity must be redefined so that the main focus lies not so much in the equality of service provision, but in developing the best mix of public and private sectors in the delivery and financing of health care.

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The Yohkoh Mission for High-Energy Solar Physics

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The Japanese Yohkoh satellite is now in orbit observing the sun with a set of x-ray imagers and x-ray and gamma-ray spectrometers. The data from this successful mission provide new information on solar flares and the sun's corona. This paper discusses the Yohkoh observations and presents a sample of the first scientific results from the mission.

The sun is a remarkably active star, a fact not obvious from the surface of the Earth. In the absence of sophisticated instruments, such as spectroscopes and radio telescopes, only the appearance and disappearance of sunspots, evident even to ancient observers, give a hint that the sun is other than steady and unchanging. Just within the last half century have scientists come to realize that the corona, the outermost envelope of our nearest star, is a regime of dynamic changes, extreme temperatures, and powerful flares.

The first true understanding of the physical nature of the sun's corona came in 1942 when the Swedish spectroscopist B. Edle'n (*1*) identified emission lines from the corona to be forbidden transitions of highly ionized iron and calcium atoms. This high degree of ionization, as well as the remarkable radial extent of the corona, could only be explained if the temperature of the corona is greater than 10^6 K. The means of maintaining such high temperatures above a photosphere at 5000 K remains a leading problem of astrophysics.

Solar flares are an even more dramatic evidence of high energy processes on the sun than the presence of the hot corona. First observed in 1859 by Lord Carrington (*2*) as a fleeting brightening within a group of sunspots, it was only with the advent of the space age that the true physical properties of solar flares began to be appreciated. A large flare releases a prodigious amount of energy ($>10^{31}$ ergs) over a short period of time (minutes to hours). In addition to electromagnetic radiation spanning the entire spectrum from gamma rays to radio waves, a flare may accelerate charged particles to gigaelectron volt energies and eject great amounts of mass from the sun into interplanetary space.

Although a satisfactory understanding of flare physics still eludes us, some phenomenological details are generally agreed. The energy that powers a flare is stored in the magnetic field of the chromosphere and corona (that is, in the atmosphere above the photosphere). The dominant structures in flares, as well as in the general corona, are the magnetic loops that contain and constrain hot plasma and energetic particles. Both electrons and protons are accelerated nearly simultaneously, contrary to earlier suppositions. High upward velocities (>500 km s^{-1}) of hot ($>10^7$ K) are observed in the early phases of many flares. Very high temperature (30 to 50 × 10^6 K) thermal plasmas are produced by flares and a typical flare will exhibit a wide range of temperatures in its most powerful phase. Neutrons, indicative of high-energy nuclear processes, have been detected from some flares.

Existing data are often too ambiguous and inhomogeneous or are too low in angular and temporal resolution to adequately constrain flare theory. The obvious next step toward an improved observational description of flares is to obtain better information on the detailed location in the sun's atmosphere and the relative time phasing of high energy flare phenomena. This is the primary objective of the Yohkoh mission. Secondarily, the soft x-ray telescope is used to study the evolution of solar activity and the corona during the periods when a flare is not actually in progress.

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