AGING, HEALTH CARE, AND SOCIAL SECURITY: THREE ESSAYS

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FOREWORD

Low fertility levels in many countries are creating aging populations whose demands for health care and income maintenance (social security) will increase to unprecedented levels, thereby calling forth policies that will promote increased family care and worklife flexibility. The Population Program at IIASA is examining current patterns of population aging and changing life-styles, projecting the needs for health and income support that such patterns are likely to generate during the next several decades, and considering alternative family and employment policies that might reduce the social costs of meeting these needs.

The program is seeking to develop a better understanding of how fertility and mortality combine to create aging populations, with high demands for health and income maintenance, and reduced family support systems that can provide that maintenance. The research will produce analyses of current demographic patterns, primarily in IIASA countries, together with an assessment of their probable future societal consequences and impacts on the aging. It will consider the position of the elderly within changing family structures, review national policies that promote an enlarged role for family care, and examine the costs and benefits of alternative systems for encouraging worklife flexibility by transferring income between different periods of life.

The question of aging, health care, and social security was addressed in one of the sessions of a conference on health care in Moscow, organized by the Soviet Ministry of Health and IIASA. The three essays collected here were presented at that session. They deal with the rising cost of health care, using the United States as an example; the role social security plays in the economies of developed countries; and the impact of rapidly aging populations on public programs, particularly health care.

A list of related IIASA publications appears at the end of these three essays.

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HEALTH CARE EXPENDITURES AND SYSTEMS OF COST CONTROL

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1. INTRODUCTION

Throughout the Western market economies -- and possibly in the Socialist republics as well -- the share of national resources claimed by the provision of health services has risen rapidly in the last two decades. Table 1 and Figures 1 and 2 chronicle this development for the United States, a nation that maintains probably the most detailed accounts of expenditures.

It is seen that roughly 10 percent of the United States gross national product (GNP) is currently absorbed by the provision of health care. That ratio is expected to rise to roughly 11 percent by the end of this decade (see Table 1). The comparable ratio in 1960 was only 5.3 percent. In view of the gradual aging of the US population (a subject dealt with in depth by my colleague Dr. Wilensky) and in view of the probable further development of resource-intensive, new medical technology, it is reasonable to suppose that the ratio will rise beyond 11 percent during the 1990s. That prospect is viewed by many Americans as a source of concern, as resource allocations to health care compete with potential allocations of resources to alternative social objectives. At this time,

Table 1. Share of US resources allocated to health services, 1929-1990.

Aggregate and Per Capita National Health Expenditures, by Source of Funds and Percent of Gross National Product, Selected Calendar Years, 1929-1990

Year	Gross National Product (billions)	Health Expenditures: Total Amount (billions)	Total Per Capita[1]	Total Percent of GNP	Private Amount (billions)	Private Percent of Total	Public Total Amount (billions)	Public Total Percent of Total	Public Federal Amount (billions)	Public Federal Percent of Total	Public State and Local Amount (billions)	Public State and Local Percent of Total
Historical												
1929	$103.4	$3.6	$28.49	3.5%	$3.2	86.4%	$0.5	13.6%	N.A.	N.A.	N.A.	N.A.
1940	100.0	4.0	29.62	4.0	3.2	79.7	0.8	20.3	N.A.	N.A.	N.A.	N.A.
1950	286.2	12.7	81.86	4.4	9.2	72.6	3.4	27.2	1.6	12.8	1.8	14.4
1955	399.3	17.7	105.38	4.4	13.2	74.3	4.6	25.7	2.0	11.3	2.6	14.4
1960	506.0	26.9	146.30	5.3	20.3	75.3	6.6	24.7	3.0	11.2	3.6	13.5
1965	688.1	42.0	212.32	6.1	31.0	73.9	11.0	26.1	5.8	13.4	5.3	12.7
1966	753.0	46.4	231.88	6.2	32.8	70.7	13.6	29.3	7.4	15.9	6.2	13.4
1967	796.3	51.9	256.81	6.5	32.9	63.4	19.1	41.2	11.9	25.6	7.1	15.3
1968	868.5	58.5	286.17	6.7	36.3	62.1	22.2	37.9	14.1	24.1	8.0	13.7
1969	935.5	66.0	319.69	7.1	41.1	62.3	24.9	37.7	16.1	24.4	8.9	13.5
1970	982.4	74.9	359.41	7.8	47.1	62.9	27.8	37.1	17.6	23.5	10.2	13.6
1971	1,063.4	83.1	394.74	7.8	51.4	61.9	31.7	38.1	20.3	24.4	11.4	13.7
1972	1,171.1	93.5	440.34	8.0	58.1	62.1	35.4	37.9	22.8	24.4	12.6	13.5
1973	1,306.5	103.0	481.65	7.9	63.7	61.8	39.4	38.2	25.1	24.4	14.2	13.8
1974	1,412.9	116.3	539.11	8.2	69.1	59.5	47.2	40.8	30.5	26.2	16.7	14.4
1975	1,528.8	132.1	607.58	8.6	75.8	57.4	56.3	42.6	37.1	28.1	19.2	14.6
1976	1,702.2	148.9	678.79	8.7	85.7	57.5	63.2	42.5	42.6	28.6	20.6	13.9
1977	1,899.5	169.9	768.30	8.9	99.3	58.4	70.6	41.6	47.4	27.9	23.2	13.7
1978	2,127.6	188.6	845.53	8.9	108.0	57.2	80.7	42.8	53.9	28.6	26.8	14.2
1979	2,368.8	212.2	942.94	9.0	120.8	56.9	91.4	43.1	60.9	28.7	30.5	14.4
Projections												
1981	2,864.3[2]	278.5	1,216.00	9.7	157.7	56.6	120.8	43.4	80.7	29.0	40.1	14.3
1985	4,653.2[2]	462.2	1,946.00	9.9	255.7	53.3	208.8	44.7	139.7	30.2	68.8	14.5
1990	7,588.7[2]	821.0	3,309.00	10.8	440.0	53.8	381.0	46.4	262.5	32.0	118.5	14.4
Average Annual Percent Increases for Selected Periods												
1950-55	3.5	6.9	5.2	–	7.5	–	6.2	–	4.6	–	7.6	–
1955-60	8.3	8.7	6.8	–	9.0	–	7.5	–	8.4	–	6.7	–
1960-65	5.3	9.3	7.7	–	8.8	–	10.8	–	13.3	–	8.0	–
1965-70	7.4	12.3	11.1	–	8.7	–	20.4	–	25.7	–	14.0	–
1970-75	9.2	12.0	11.1	–	10.0	–	15.2	–	16.1	–	13.5	–
1975-79	11.6	12.8	11.6	–	12.4	–	12.9	–	13.2	–	12.3	–
1979-81	10.0	14.6	13.5	–	14.4	–	15.0	–	15.1	–	14.7	–
1981-85	12.9	13.5	12.5	–	13.0	–	14.4	–	14.7	–	13.7	–
1985-90	10.3	12.2	11.2	–	11.6	–	13.9	–	13.4	–	12.1	–
1965-79	9.2	12.3	11.2	–	10.2	–	16.3	–	18.6	–	13.2	–
1969-79	9.7	12.4	11.4	–	11.4	–	13.9	–	14.2	–	13.1	–
1979-85	11.9	13.9	12.8	–	13.5	–	14.6	–	14.8	–	14.0	–
1979-90	11.2	13.1	12.1	–	12.6	–	13.9	–	14.2	–	13.1	–

[1]Robert M. Gibson, "National Health Expenditures, 1979" *Health Care Financing Review*, Summer 1980, p. 16. Data for selected years are unpublished.

[2]The Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, *1980 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, June 17, 1980. Alternative II (intermediate) economic assumptions were used.

[3]Per Capita amounts in projections are rounded to the nearest dollar

SOURCE: Freeland and Schendler 1981, p. 112.

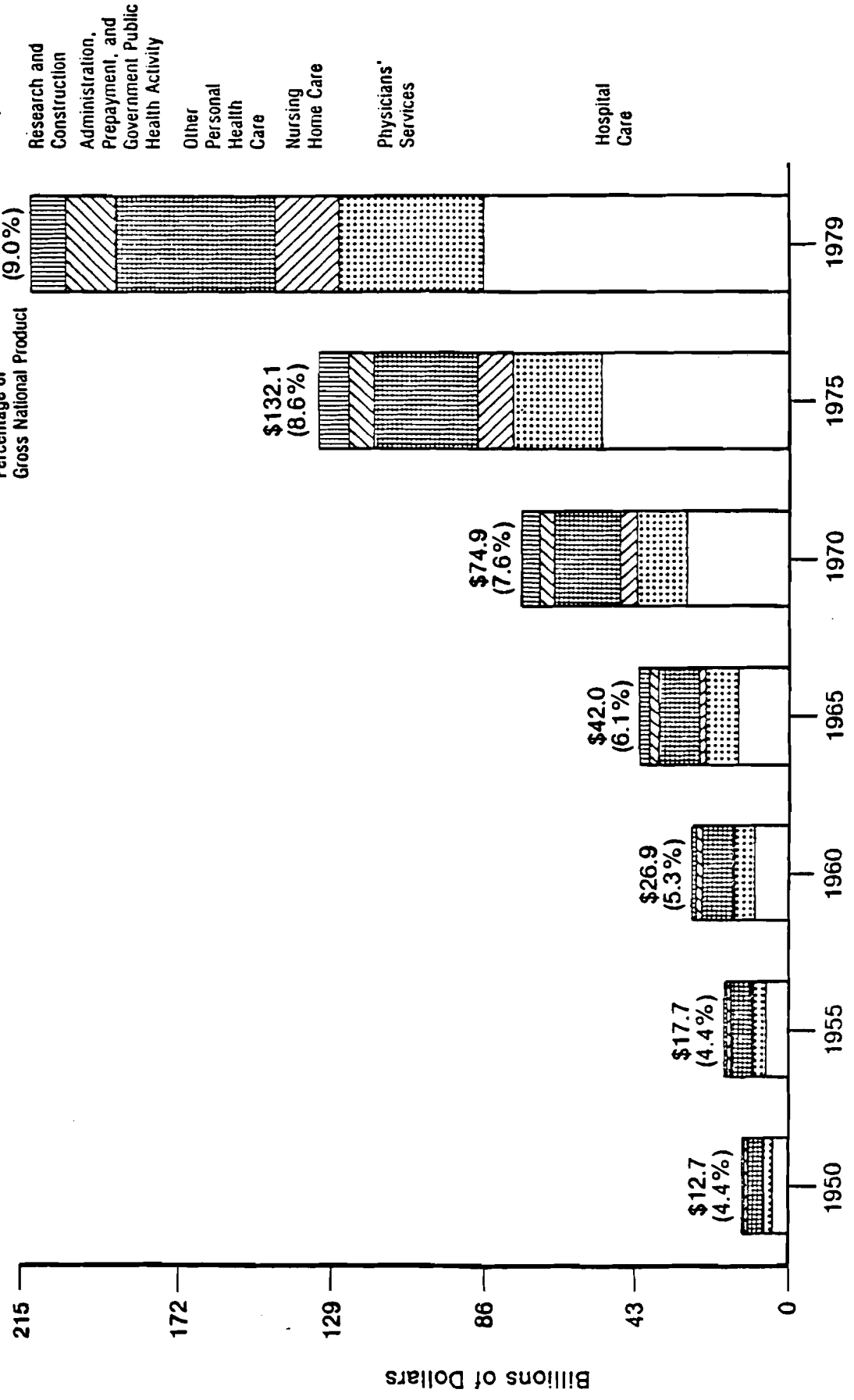

Figure 1. National health expenditures; selected calendar years 1950-1979.

SOURCE: Gibson 1980, p. 12.

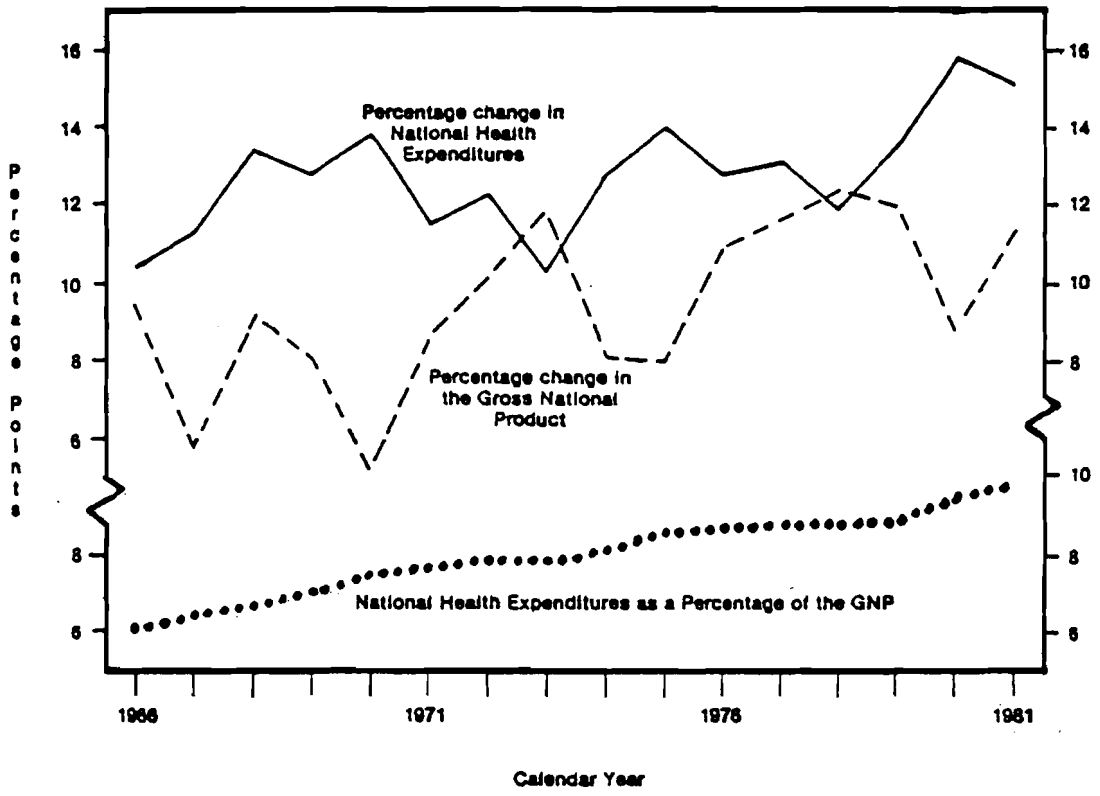

Figure 2. National health expenditures and gross national product: growth and relative sizes, 1966-1981.

SOURCE: Gibson and Waldo 1982, p. 3.

the nation is given to an intense debate over future policy on health care, a debate apparently paralleled elsewhere in the Western nations.

2. SOURCES OF COST GROWTH

For many years during the later 1960s and early 1970s, Americans were inclined to view the increase in their outlays on health care as a uniquely American phenomenon. It was thought -- and is still widely believed -- that one of the major drivers behind the phenomenon was the gradual removal of financial barriers to health care. In their *National Health Expenditures: Short-Term Outlook and Long-Term Projections* article, for example, Freeland and Schendler (1981) offer the following observation:

> Factors contributing to the rapid growth in national health expenditures are numerous and interrelated. The interplay of demand incentives and supply incentives contribute to the growth of specific types of medical expenditures. Two factors in particular are noteworthy: 1) a demand-side factor, the role of third-party payments in increasing consumer demand for services; and 2) a supply-side factor, the fee-for-service and cost-based reimbursement systems which lack incentives to provide medical care in the least expensive manner (p.115).

By "cost-based reimbursement" in this context the authors refer to the wide-spread practice in the United States of reimbursing inpatient facilities on a *retrospective full-cost basis*, a method that clearly does lack any built-in mechanism for assuring cost-effectiveness.

Figure 3 indicates the growth of third-party payment for health care in the United States. It is seen that third-party payment (private and public health insurance) now accounts for about two-thirds of total national expenditures for health care, up from about 50 percent in 1965. Government sources alone account for about one-third of total national health expenditures.

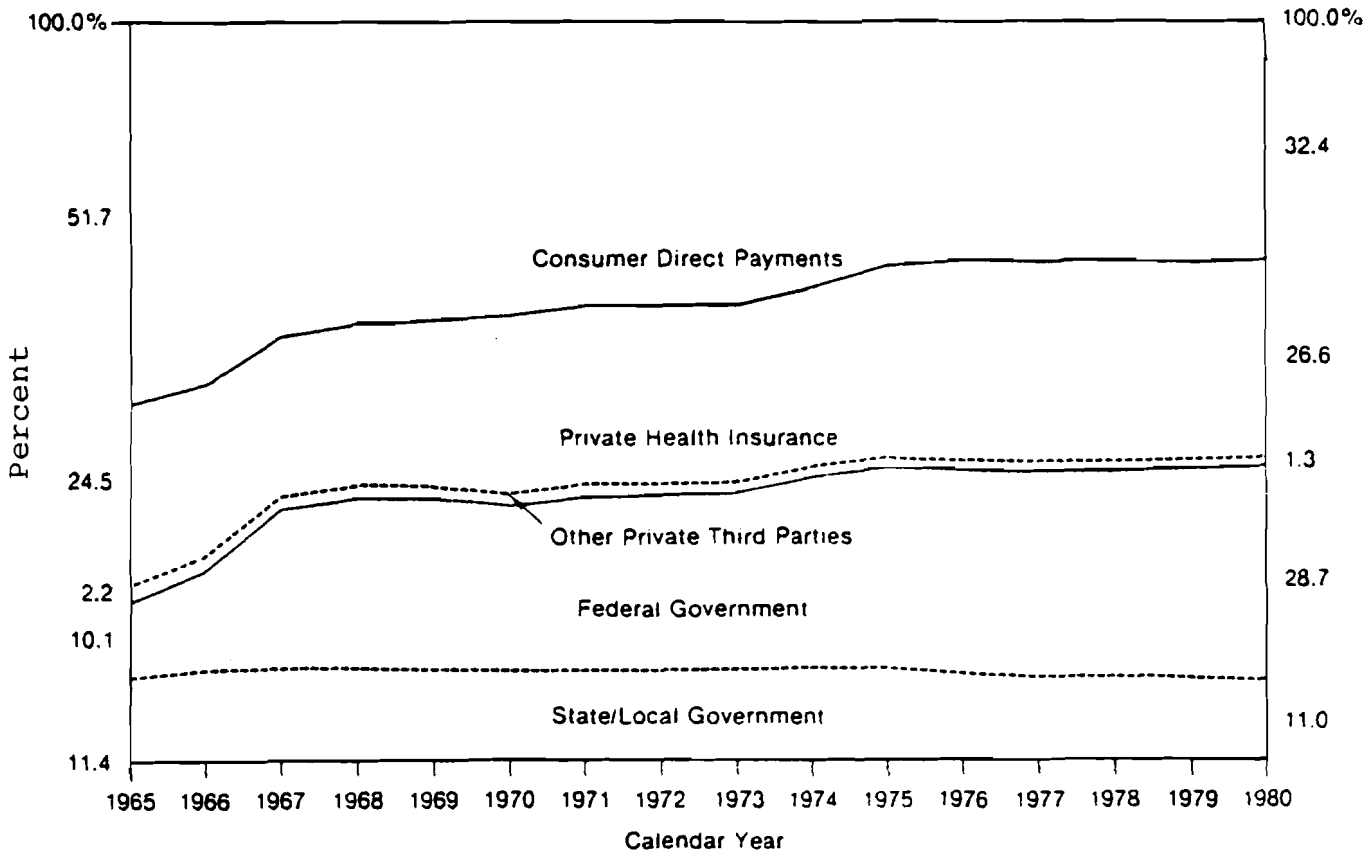

Figure 3. Percentage shares of expenditures for personal health care, 1965-1980.

SOURCE: Gibson and Waldo 1981, p. 6.

Even so, roughly one-third of all personal expenditures on health care are still paid directly by consumers at the time services are received, a figure probably higher than seems widely supposed among the public.

As is shown in Figure 4, the degree of direct cost-sharing by patients varies by type of health service. Inpatient services rendered by hospitals (excluding physician services rendered there) are more or less fully covered by third-party payers. By contrast, all other health services are much less than fully covered. For physician services of all types (including physician services rendered in the hospital) patients now pay an average of roughly one-third directly out of pocket, a ratio that rises to roughly 60 percent for strictly ambulatory physician care (see Table 2). For drugs and medical appliances and dental care, third-party payment is still relatively insignificant.

There is persuasive empirical evidence at the microeconomic level that, other things being equal, the utilization of health services by patients, and the total outlay on health care they occasion, is negatively correlated with the degree of cost-sharing at point of service (see, for example, Newhouse et al. 1981). The results from formal empirical research on the issue conform well with common sense. It is less well known how this behavior at the microeconomic level translates itself into overall national health expenditures. It is reasonable to suppose that, if the aged and the poor in the United States were not covered by publicly-funded health insurance programs (as, in fact, they are) then overall health care expenditures in the United States would be likely to be somewhat lower than they are now. On the other hand, it does not follow from this hypothesis that the absence of cost-sharing by patients necessarily drives up overall health care expenditures, because administrative constraints on total expenditures can readily substitute for economic incentives toward the same end.

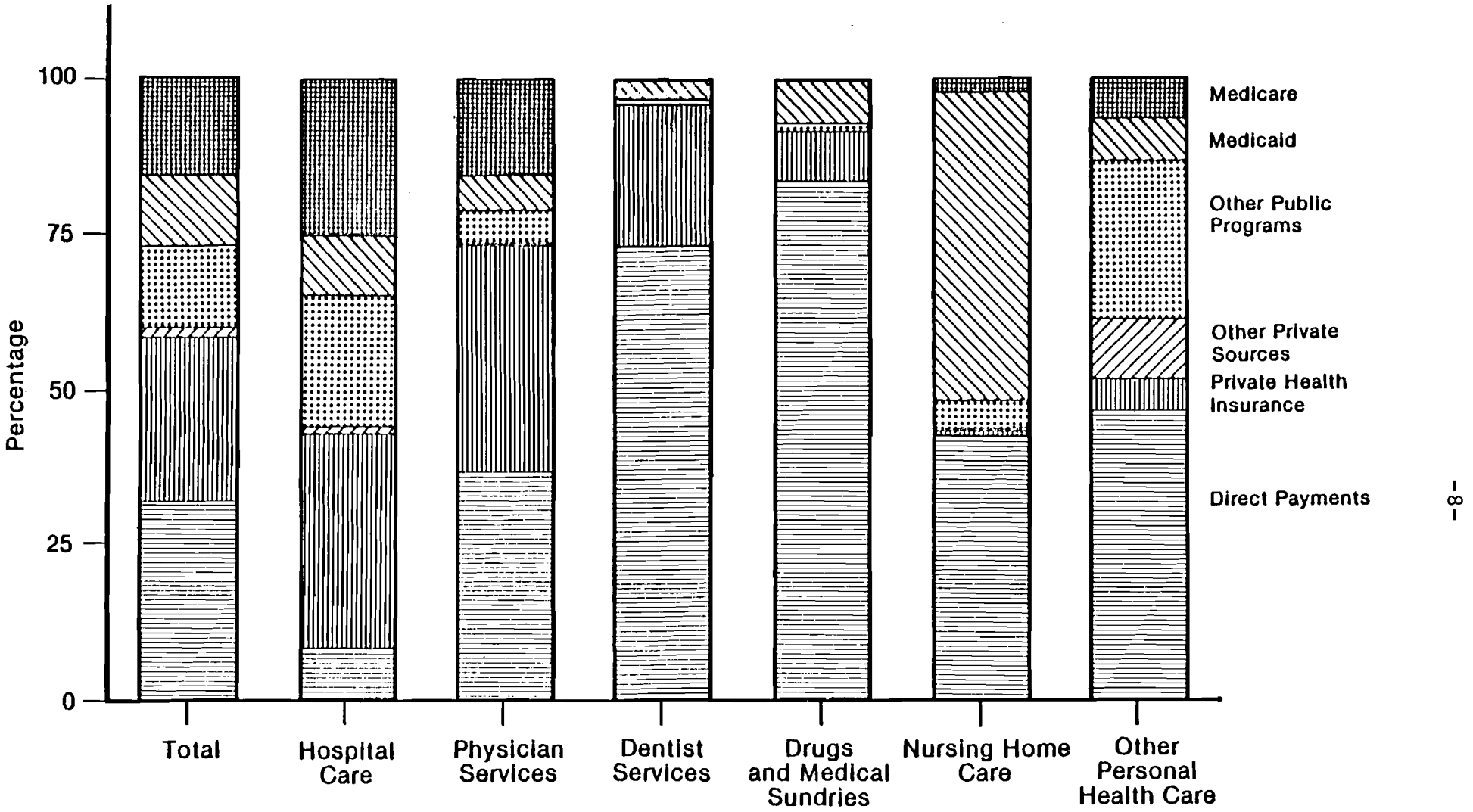

Figure 4. Sources of funds for personal health care expenditures, by type of expenditure, 1970.

SOURCE: Gibson 1980, p. 14.

Table 2. Percentage of health expenditure paid out of pocket (sample of 14,000 US families).

Type of service	Family	Third-party (insurance, etc.)
1. Ambulatory physician care	59	41
2. All physician services	34	66
3. Dental services	80	20
4. Prescribed medicine	80	20
5. Repair of glasses and contact lenses	91	9
6. Medical appliances and supplies	79	21
7. Inpatient hospital services (exc. physician care)	12	88

SOURCE: Kasper et al. 1980.

To illustrate this point, Table 3 presents a (necessarily cursory) synopsis of the health insurance systems in three countries with which the United States can be reasonably compared: Canada, France, and West Germany. All three countries have more extensive health insurance coverage than does the United States and yet, none of them devotes a greater proportion of their GNP to health care than does the United States. On the contrary, both France and Canada appear to devote a considerably smaller proportion of their GNP to health care than does the US. Even West Germany, whose health insurance system is incredibly extensive and generous by US standards, devotes only about the same percentage of GNP to health care as does the US.

Figures 5 and 6 sharpen this perception. By and large, the recent annual growth in national health care expenditures and the current level of these expenditures is not well explained by the degree of health insurance coverage in the various nations. If there is one dominant factor influencing the percentage of GNP a nation devotes to health care -- certainly in the Western market economies -- it appears to be the average real per capita income in the nation (see Figures 7 and 8). It would be interesting to know to what extent this phenomenon is paralleled in the Socialist republics. Quite probably the phenomenon of rapid growth in national health care expenditures is impervious not only to different forms of health insurance within the politically relatively homogeneous Western democracies, but also to more substantial differences in political systems.

3. POLICIES TO CONSTRAIN THE GROWTH OF HEALTH CARE EXPENDITURES

As already noted, policy makers in the Western nations have come to view the persistent rapid growth of health care expenditures as an economic threat. Since about the mid 1970s, when this perception firmly took roots in official thinking, there have been numerous attempts to introduce measures that might

Table 3. Overview of national health insurance systems.

PARAMETER	CANADA	FRANCE	WEST GERMANY
ADMINISTRATION	Ten independent provincial medical and hospital plans operating within federal guidelines and with federal cost sharing.	A national system of sickness funds organized on a geographic basis and supervised by the Ministry of Health & Social Security.	A mosaic of over 1,500 sickness funds organized in state- and national associations and operating within federal statutes.
ROLE OF PRIVATE INSURANCE	Confined to provision of supplemental coverage.	Confined to provision of supplemental coverage.	Covers some 7 percent of the population for basic benefits.
POPULATION COVERAGE	Public system provides universal coverage on equal terms.	The national system now covers 99 percent of the population.	The statutory system covers 93 percent of the population. Some 7 percent has private coverage; 1 percent has no coverage.
BENEFITS	Medical services, hospital services, for special groups: dental care, drugs.	Medical services, hospital services, prescription drugs, medical appliances, cash benefits.	Medical services, hospital services, dental care, prescription drugs, medical appliances, cash benefits.
PREDOMINANT MODE OF REIMBURSING PROVIDERS	Hospitals: global budgets Physician: fee-for-service reimbursement under province-wide, negotiated fee schedules.	Hospitals: per diems plus fee-for-service for phys. services Hospital phys.: salary Private phys.: fee-for-service.	Hospitals: per diems Hospital phys.: salary Private phys.: fee-for-service
FINANCING	A mixture of taxes and direct premiums. Mixture varies from province to province. Federal govt. bears about 50% of costs.	Basically a payroll tax; about 3.5% of income paid by employee; about 12.5% paid by employer.	A payroll tax of about 11% of earnings shared equally by employer and employee.
COST SHARING BY PATIENTS	Originally rare. Increasing somewhat in provinces that permit physicians to opt out of the system.	Coinsurance rate of between 30% to zero, depending on severity of illness.	There is virtually no cost sharing except for a modest co-payment per prescription.
PERCENT GROWTH HEALTH EXPENDITURES average annual increase for period indicated	1971-74: 12.1% 1974-75: 18.0% 1975-77: 13.0%[d]	1970-75: 16.8%[c] 1975-78: 15.9% 1978-79: 16.8%[d]	1970-75: 20.1%[a] 1975-76: 9.8%[a] 1976-77: 4.8% 1977-78: 7.1%[d]
PERCENTAGE OF GROSS NATIONAL PRODUCT GOING TO HEALTH CARE	1975: 7.1% 1976: 7.2% 1977: 7.1%[d]	1975: 6.8%[c] 1978: 7.1% 1979: 7.3%[d]	1976: 9% to 10%[b]

SOURCE: Reinhardt 1980.

[a] Outlays under the statutory health insurance system only.

[b] Rough estimate. A figure comparable to the US "national health expenditures".

[c] The French figures are akin to the US "personal health care" series.

[c] Preliminary estimates.

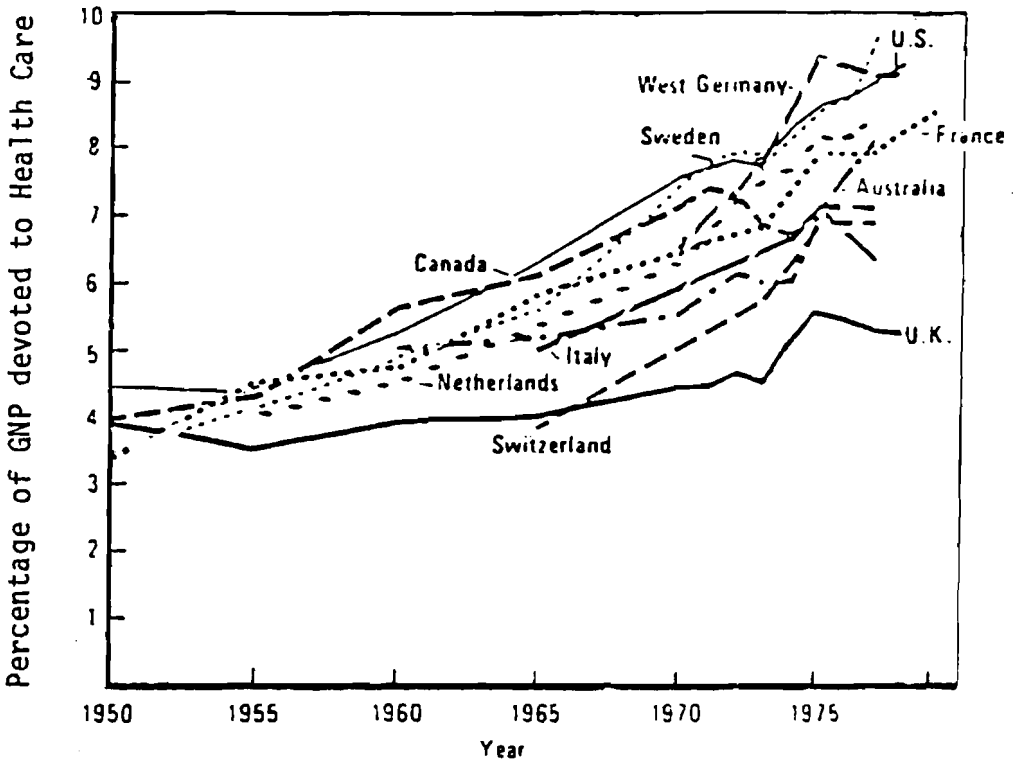

Figure 5. Secular growth in health care expenditures.

SOURCE: Maxwell 1981, p. 44.

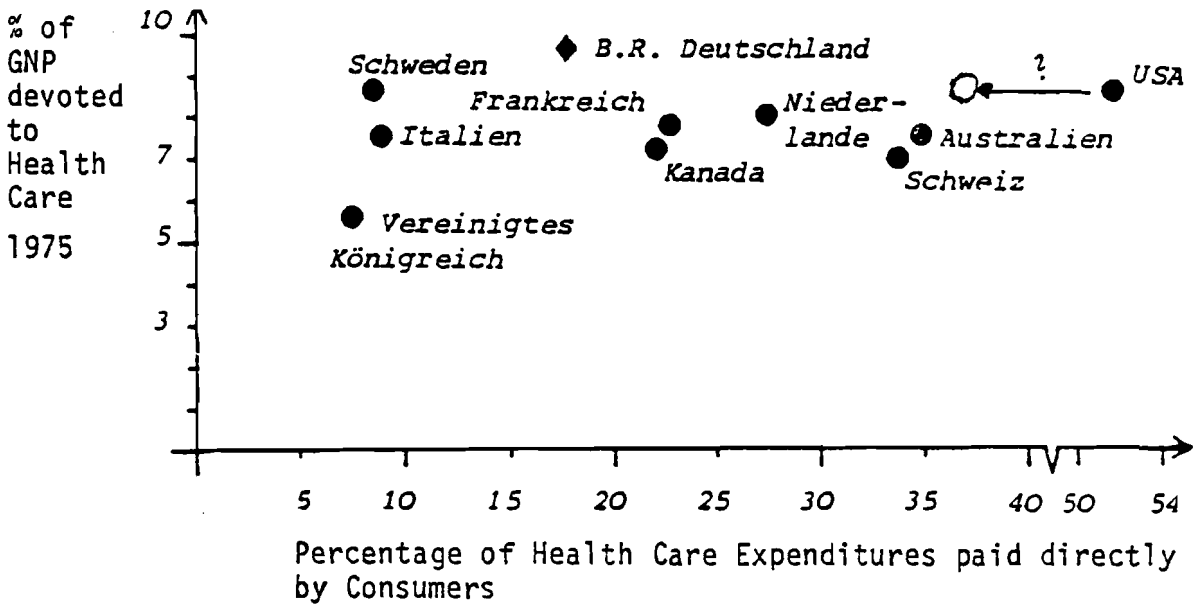

Figure 6. Health care expenditures and cost sharing.

SOURCE: Pfaff 1982, p. 100.

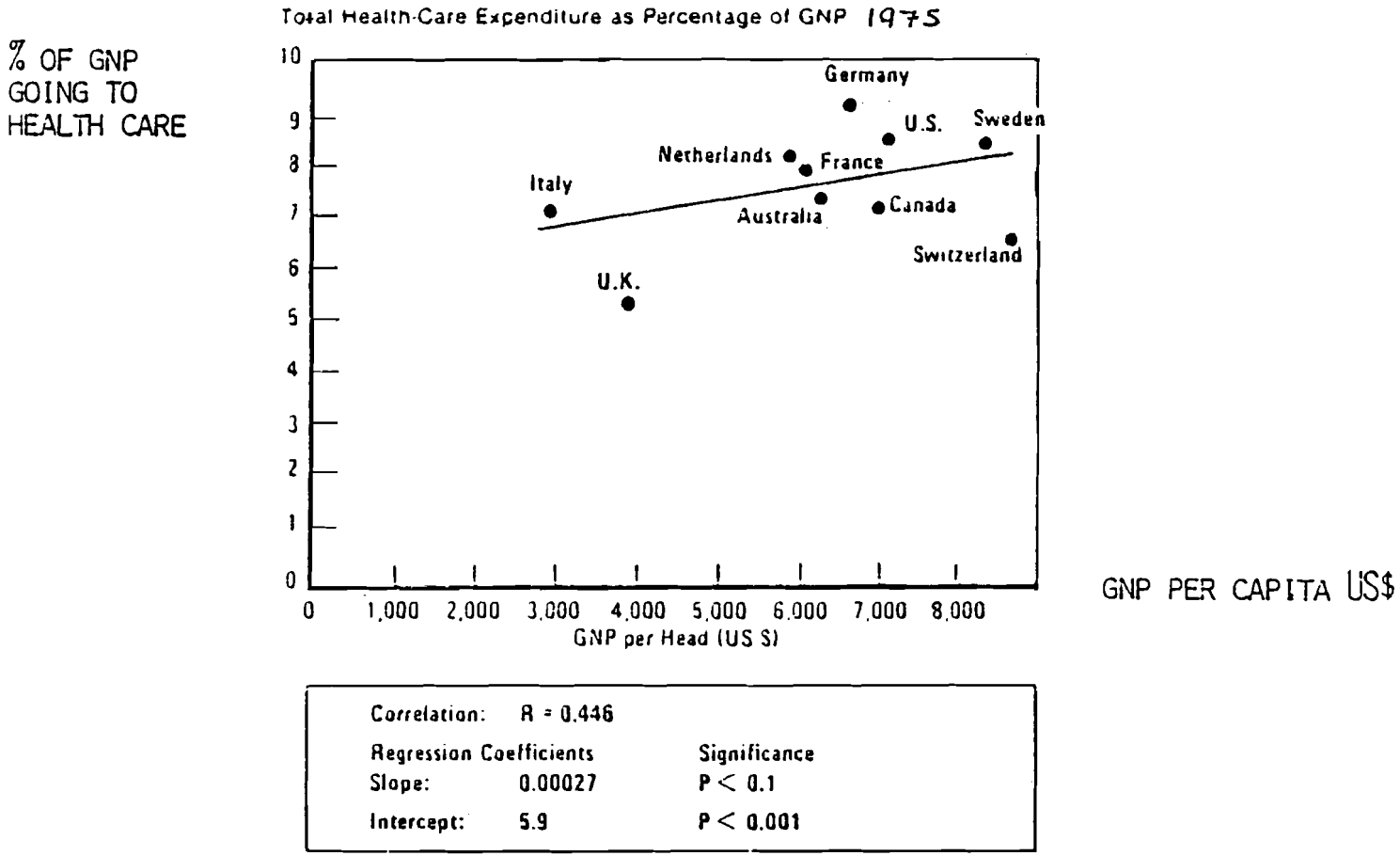

Figure 7. Percentage of GNP going to health plotted on GNP per capita, 1975.

SOURCE: Maxwell 1981, p. 39. Cited in Pfaff 1982, p. 90.

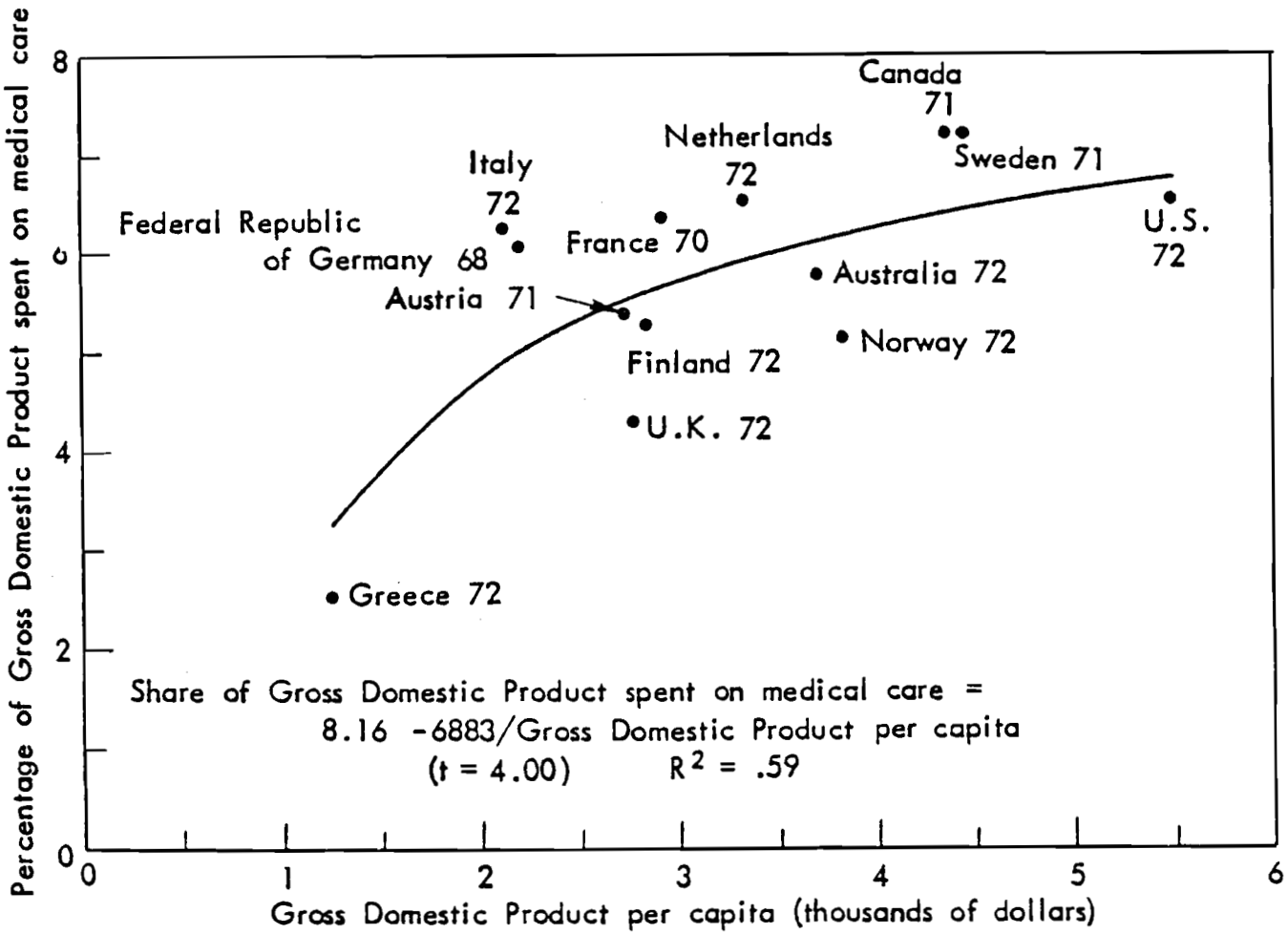

Figure 8. Relationship between gross domestic product and share spent on medical care in 13 countries (recent years).

SOURCE: Newhouse 1976.

constrain the future growth of these outlays. In this section I shall review these measures briefly, with particular emphasis on the approach currently being debated in the United States. Before doing so, however, it may be well to explore just why expenditures on health care are so widely viewed with misgivings.

3.1. The Rationale for Cost-Containment in Health Care

One commonly cited reason for cost-containment policies in health care is that sustained rapid growth in health expenditures would lead a nation's economy to the brink of economic ruin. By the tenor of its language, this is a macro-economic argument. The argument appears to imply that health care expenditures come at the expense of capital formation. On the thesis that capital formation is the *sine qua non* of economic growth, it is thought that current increases in health care expenditures come at the expense of future generations. How compelling is this argument?

Frankly, the argument strikes me as a peculiar one to offer in times of the relatively high unemployment now plaguing the Western market economies. In such an environment, the macro-economist's natural posture should be to celebrate consumer expenditures, regardless of their purpose. Indeed, it is for precisely that reason that policy makers typically cheer increases in consumer expenditures on, say, automobiles or hoola-hoops as signs of economic health, fully recognizing that expenditures on automobiles place a mortgage on our physical health, on the safety of our environment, on our energy reserves, on our foreign reserves, and on our foreign policy. Bluntly put, it can be asked why added employment created through the manufacture of automobiles or plastic toys is so so much to be preferred to added employment created through the delivery of, say, additional hospital days. If health care expenditures do divert resources from capital formation*,

*Actually, not all health care expenditures are consumption in the first place. A good many of these expenditures are *bona fide* investments in the productivity of people and in their ability to enjoy life in future years.

one could surely think of numerous other, more frivolous consumption expenditures-- e.g., fashion, or alcohol and tobacco -- that also divert resources from capital formation and that seem sensible targets for constraints on consumption. In short, then, from a strictly macroeconomic viewpoint, the need to constrain health care expenditures is no more compelling -- and perhaps less so -- than would be the constraining of many other expenditures.

An alternative response to the question originally raised may be that, while health care expenditures are not a threat to a nation's economy from a macroeconomic viewpoint, they do not fall unevenly and capriciously on the budgets of individual households, municipalities, or state and federal agencies. To be sure, in the United States these local budget crises are very real and painful, and they may be troublesome in other nations as well. On the other hand, these expenditure flows could be collectivized under a truly national health insurance system. In the process the crisis might largely disappear altogether. The budget argument, then, does not strike me as very compelling either.

The problem, of course, is that a national health insurance system tends to distort the individual benefit-cost calculus normally associated with consumption expenditures. It is widely appreciated that third-party payment reduces or eliminates the consumer's incentive to observe economy in the use of health care resources. When health care is completely free to the consumer, he or she may utilize health services beyond the point at which the benefits he or she derives from these health services justify the cost of resources expended on these services. At the same time, the reimbursement systems favored by most Western nations give health care producers (hospitals, physicians, nursing homes, and so on) considerable power to determine their take from the collective treasury. This phenomenon is not prevalent in the consumption of alcohol or children's toys. While we may deplore the use of alcohol on medical or sociological grounds, we are not concerned over national expenditures on alcohol, tobacco, or fashion precisely because

(a) these expenditures are not collectively financed, and (b) they are determined by a series of voluntary, individual exchanges between consenting adults who are usually capable of assessing their costs and benefits associated with these exchanges. In a market economy one imputes economic legitimacy to such exchanges.

In short, then, our sense of crisis in connection with health care expenditures strikes me in the main as a loss of faith in the economic legitimacy of the process determining the level of these expenditures. *The problem is not truly one of macroeconomics, nor need it be a budgetary one. It is a benefit-cost crisis.*

Underlying this view is the notion that the health status of individuals -- and the corresponding aggregate measures for entire nations -- is a function of a large set of inputs (nutrition, hygiene, life-style, medical care, etc.) of which health care is but one particular type. Furthermore, it is reasonable to assume that there are diminishing marginal returns to any particular input, health care included. Figure 9 depicts this hypothetical relationship diagrammatically. Without denying that some individuals still find themselves in the upward sloping segment of the health production function (say, at point B), one can hypothesize that many individuals also find themselves in the flat or even the negatively sloped portion of the curve (e.g., at points A, D, or E). To the extent that such individuals are fully insured, there is really no mechanism to force them into a careful assessment of the benefits yielded by further health care expenditures. If improved health status is the ultimate objective, then changes in life style, or expenditures on improved hygiene or nutrition might be much more productive than added outlays on health care. In terms of Figure 9, it may be much more cost-effective to shift up the entire curve (say, to point C), rather than to move along the curve.

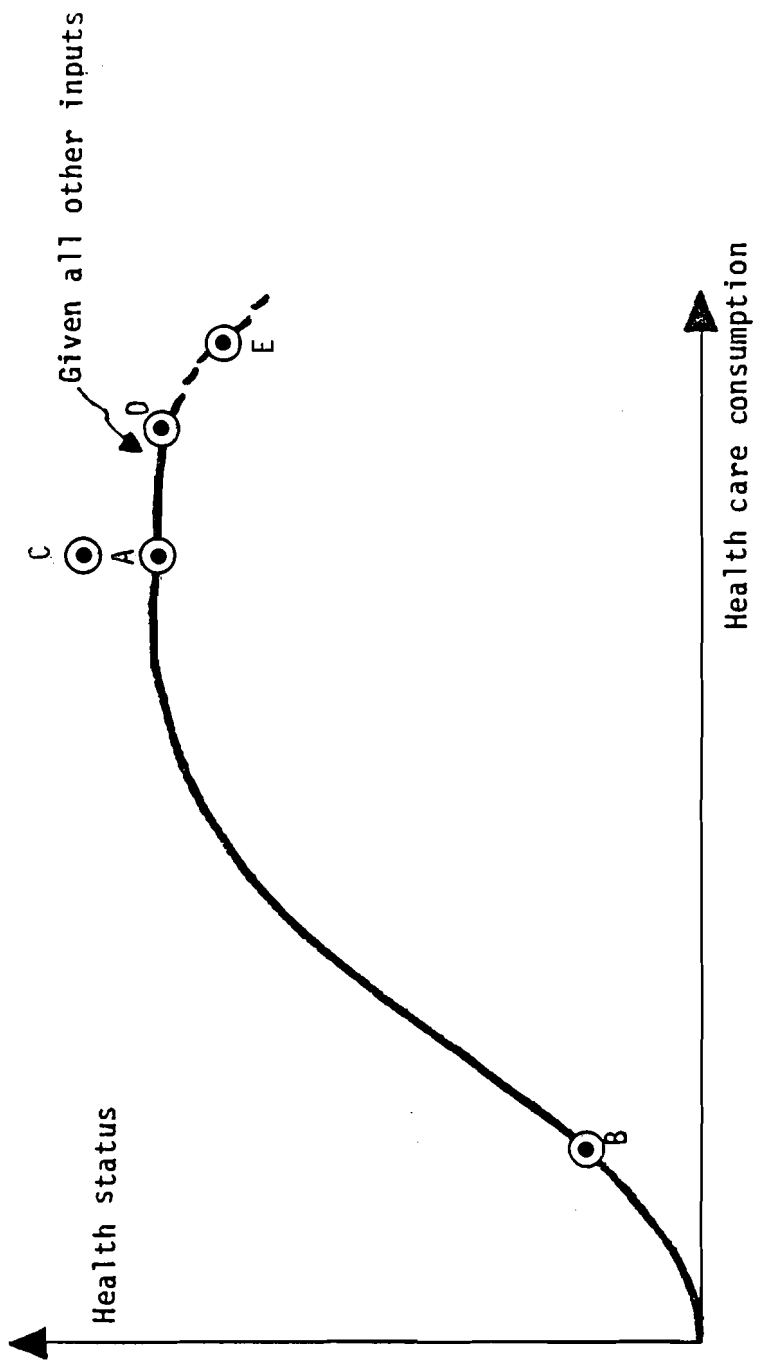

Figure 9. Hypothetical production function for health.

Sooner or later almost all discussion on the merits or demerits of cost-containment in health care are driven to this interpretation. There rarely ever is the intent in these discussions to deprive individuals of potentially productive health care consumption. Unfortunately, of course, the absence of that intent does not guarantee one that particular cost-containment measures will not have that undesired effect in practice.

3.2. Cost-Containment Strategies

As noted earlier, since about the mid 1970s most Western nations have sought to constrain the growth of health care expenditures through overt public policy. The form of this intervention has varied from country to country, in line with the institutional framework through which public policies must work. The explicit or implicit goal of these policies, however, has tended to be identical: to peg the growth of national health expenditures to the growth of gross national product, at least over the long run. That goal is, of course, arbitrary. There is no empirical support for the proposition that a society either should or would prefer to allocate a constant proportion of its resource budget to a commodity such as health care. If the past is any guide, societies generally choose to allocate an increasing proportion of GNP to health care as GNP per capita grows (see Figures 7 and 8). Why this trend should be arrested now through public policy requires further thought. After all, even if the annual growth in health care expenditures were to outpace the annual growth of a nation's GNP in the foreseeable future, it does not follow that the nation's standard of living (measured in terms of non-health GNP) will therefore fall below current levels. Table 4 speaks to this point.

In Table 4 it is assumed that GNP in the United States will grow from its nominal level of $2,626 billion in 1980 at a nominal annual growth rate of 9 percent (or a real, inflation adjusted growth rate of 3 percent per year). Row A of the table shows the percentage of GNP going to health care on the assumption that total health care expenditures grow at rates

Table 4. Projected impact of health care expenditures on non-health GNP per capita: United States, 1980-2000.

	Assumed average annual growth (in percent in nominal health care expenditures (nominal GNP assumed to grow at 9% per year)			
	9	11	13	15
A. Health care expenditures as percent of GNP in the year 2000	9.4	14.0	20.9	31.2
B. Average annual growth in real non-health GNP per capita, in *1976 dollars*	2.1	1.83	1.42	0.72
C. Total percentage increase (over the two decades) in real non-health GNP per capita	52	44	33	16

ASSUMPTIONS: Nominal GNP will increase at an average annual rate of 9 percent from its base-year value of $2,626 billion in 1980. Total health care expenditures in that year were $247.2 billion or 9.4 percent of GNP. The general price level will increase at an average annual rate of 6 percent and the US population is assumed to grow at an annual rate of 0.9 percent, from a base of 231.7 million in 1980. All growth rates are instantaneous (compounded continuously).

of 9, 11, or 13 percent per year during the period 1980-2000 from the 1980 level of $247.2 billion. Row B indicates the annual growth rate in real, non-health GNP per capita corresponding to these growth rates in health expenditures (on the assumption that the US population will continue to grow at an average annual rate of 0.9 percent). It is seen that even if the growth of nominal health care expenditures exceeds the growth of nominal GNP by 4 percentage points, real non-health GNP per capital would still grow at an average annual rate of close to 1 percent. In other words, even as drastic a growth differential as 13 percent (in health care expenditures) versus 9 percent (in GNP) would not exactly starve the nation in terms of non-health GNP.

Figure 10 presents a broad menu of potential targets for cost-containment strategies. The ultimate target of such policies tends to be A -- total health care expenditures. Targets B, C, and D are merely intervening variables that partially determine target A.

The most straightforward method of constraining the growth of health expenditures to the growth of GNP would be simply to cap total expenditures (target A). This approach seems most practical in centrally planned economies, and under the British National Health Service. It has, however, been attempted elsewhere as well. In the West German state of Bavaria, for example, attempts have recently been made to impose a cap on the total outlays of the statutory health insurance system operating in that State (Land). How effective this approach has been remains to be seen. The relative success of this so-called Bavarian Plan is still under review by the research community.

While in many of the Western economies the health care sector is much too complex and too diffuse to permit the implementation of a *global* cap on expenditures, it may nevertheless be possible to cap the flow of funds to particular sectors or to particular institutions (targets A1 and A2 in Figure 10). In Canada, for example, the individual hospital is typically subject to global, prospective budgeting, a system that differs

A. TOTAL HEALTH CARE EXPENDITURES

1. Total expenditures on particular sectors (e.g., ambulatory care)

2. Total revenues of particular providers (e.g., hospitals)

B. UTILIZATION OF HEALTH SERVICES

C. PRICES OF HEALTH SERVICES

1. Supply and use rate of inputs (manpower, beds, etc.)

2. Prices of inputs

3. Organization of the health care production process

D. PREMIUMS FOR HEALTH INSURANCE

Figure 10. Potential targets of health care cost-containment policies.

drastically from the retrospective, full-cost reimbursement of hospitals practiced in the United States. During his term in office, former President Carter did attempt unsuccessfully to impose revenue caps on the individual hospitals in the United States as well. One of the main problems with such caps, however, is that, in the short run at least, their imposition tends to reward the historically inefficient hospital and punish the efficient one.

If caps on total expenditures or on the flow of funds to individual providers are not feasible, one may seek to affect total outlays indirectly by constraining the utilization of health services (target B) or their prices (target C). Furthermore, in targeting on the prices of health services (target C), one may either seek to constrain these prices directly (through imposed ceilings on schedules of fees, charges or per diems), or one may reach beneath these output prices by targeting directly on the factors that determine the prices of health services [i.e., by aiming at targets C1 (input quantities), targets C2 (input prices) or targets C3 (the organization of resource use and health care delivery)]. Thus, one may seek to constrain the supply of physicians in a country, limit the number of hospital beds, or prescribe maximum staffing ratios for health care facilities (target C1). Additionally or alternatively, one may seek to constrain the "prices" of these inputs (target C2). For example, it might be attempted to place direct controls on the incomes of physicians and other types of health manpower, or to constrain the prices of pharmaceuticals and of other medical supplies. Finally, attempts may be made to influence directly the organization of health care delivery, with an eye towards greater economy. For example, the so-called Health Maintenance Organizations (HMOs) in the United States* represent one organizational form widely

*Broadly speaking, an HMO is a combination of insurance system and integrated provider facility. Patients in the HMO prepay an annual capitation in return for which the HMO promises to provide the enrollee with all medically necessary health services during the year. Typically, an HMO owns or manages its own ambulatory and inpatient facilities.

thought to yield overall economics in the use of health care resources (mainly of hospital care). The delegation of tasks from physicians to non-physician manpower is another potential source of cost saving in health care (Target C3). Public policy could influence the degree of task delegation either through direct edict (prescribed staffing patterns) or by confronting health care providers with financial incentives to delegate tasks to the least-cost, technically qualified health personnel.

By and large, economists look with a jaundiced eye on attempts to influence overall health care expenditures through *direct controls* on the variables listed in Figure 10. More often than not, such controls are circumvented and thereby trigger unexpected and undesirable side effects. Attempts to constrain health care expenditures are quite correctly perceived by physicians and other health workers as a direct assault upon their income. One must therefore expect these providers to resist cost-containment policies. Where this resistance cannot be brought to bear directly through the political process -- as it often is in practice -- it can be offered through the manipulation of the intervening variables shown in Figure 10. For example, within limits physicians can counteract downward pressure on their fees through increases in prescribed utilization of health services. Within limits, hospitals can stretch out average length of stay to neutralize ceilings on their per diem charges. Although the United Kingdom and Canada have demonstrated that a concerted political will to impose cost constraint *can* be effective -- at least for a while* -- in many nations the government sector is simply not sufficiently powerful to control all of the variables that must be controlled in a successful cost-containment campaign. Some observers, economists prominent among them, believe that this lack of power may be all to the good.

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*It is not clear how long the British National Health Service will continue to operate within its austere budgets, or how long Canada will be able to constrain national health expenditures to less than 8 percent of its GNP.

A hypothesis with wide currency among American health economists is that an appropriate degree of expenditure containment could be achieved simply by confronting the actors in these markets -- consumers, producers, and third-party payers -- with appropriate financial incentives to observe economy in the use of health resources. On this hypothesis it is believed that public policy need not be targeted directly on any of the variables in Figure 10 at all, but that public policy merely needs to create and maintain a framework for the appropriate determination of targets B and C. The *sine qua non* of such a framework is thought to be a system of price-competitive markets for health services and significant cost sharing on the part of patients. An integral part of the development of such a framework would be the establishment of truly competitive health insurance markets, an approach best exemplified in the *Consumer-Choice Health Plan* proposed by Alain Enthoven (1980) or the quite similar plan proposed independently by Walter McClure (1982).

Figure 11 illustrates the set of economic pressures thought by economists to be essential to the efficient functioning of a price-competitive health care system. By forcing consumers to purchase health insurance out of after-tax income and by inducing each employer to offer employees an entire array of alternative health insurance packages (possibly including an HMO option) there would be pressure on competing insurance carriers to offer price-competitive insurance packages. To be price-competitive in the insurance market, insurors would naturally have to exert pressure on health care providers (1) not to over-prescribe health services and (2) to price these services reasonably. In exerting this pressure on providers, the insurance industry would be assisted by patients who would bear a substantial fraction of the cost of the health services they receive at the point of service.

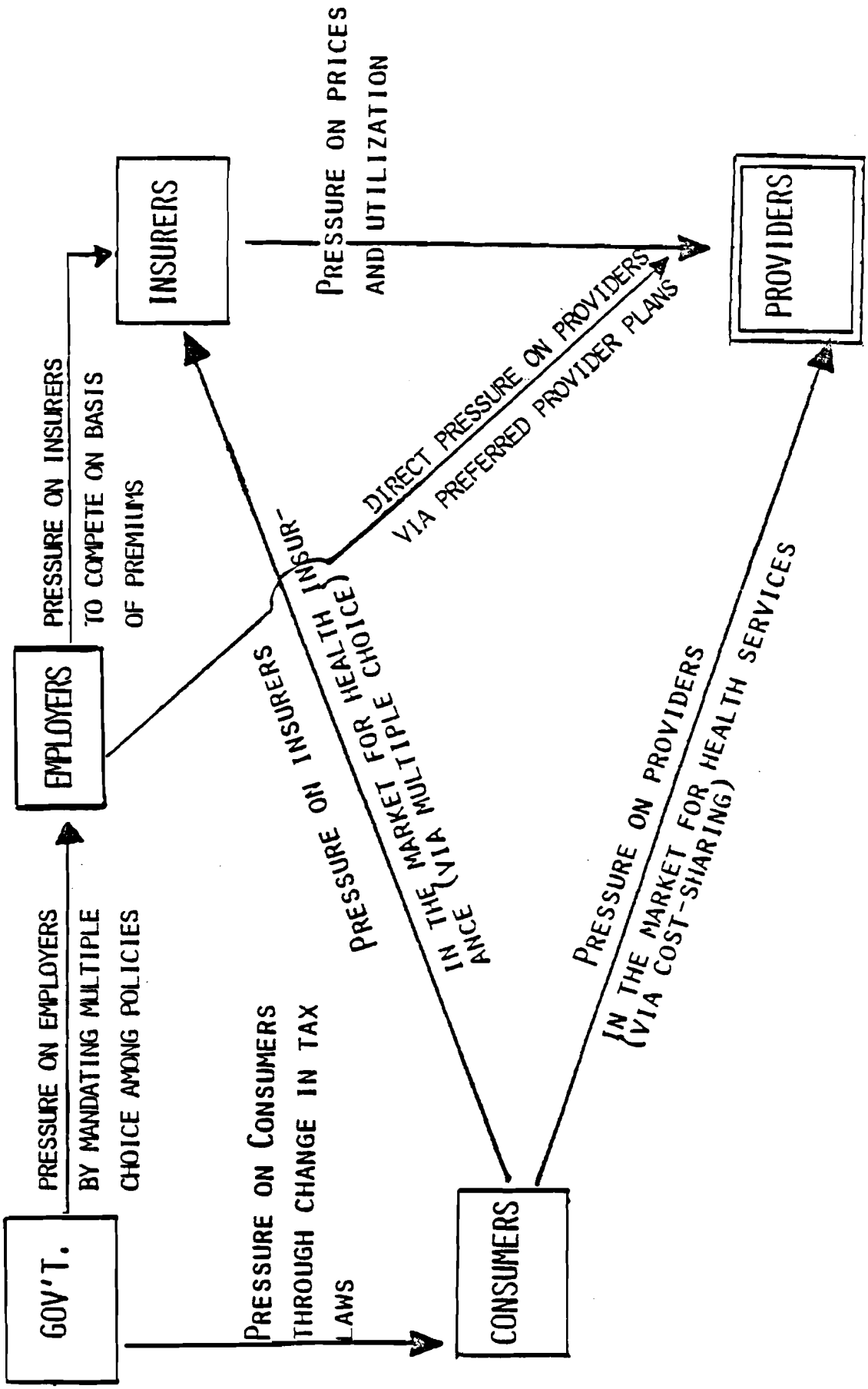

Figure 11. The pressure system expected from the pro-competitive strategy.

Finally, employers would be encouraged to enter directly with providers into arrangements whereby the firm's employees would obtain price discounts from a list of "preferred providers" (i.e., health care providers -- doctors and hospitals -- who have agreed to treat the firm's employees at discounted prices). These so-called Preferred-Provider-Organizations (PPOs) have recently appeared in several cities in the United States and are spreading fairly rapidly.

In short, then, the competitive framework envisaged by American health economists* and, incidentally, endorsed by the current Administration, calls for economic pressure on providers by both patients directly and, indirectly, through a competitive health-insurance market. The scheme can be viewed as an exasperated response to the perceived failure to constrain the growth of health care expenditures through other regulatory devices (devices that are often at odds with the wider context of a market economy).

Health care providers in the United States -- and elsewhere, for that matter -- typically profess conceptual support for the notion of a competitive market system, if only because that approach draws away fire from targets closer to home (e.g., targets C1 and C3). Unfortunately, the providers' enthusiasm for the model tends to wane once the meaning of "competition" is explained to them more concretely within the context of their own markets. Physicians, for example, generally show little enthusiasm for competition from self-employed paramedical manpower, for an expanded supply of medical manpower, or for policies to inform consumers better with regard to both the price and the quality of medical treatments.

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*American health economists do not form a distinct social or political group. Not all of them endorse the scheme described above, but many do.

This skepticism toward the market model seems to be shared by health care providers and by policy makers in other countries as well. Canada, France, and West Germany, for example, do not rely at all on the notion of competitive markets in their approach to cost and expenditure containment. Broadly speaking, the main thrust of their policies has been to constrain expenditures on physician services through negotiated or imposed fee schedules and to control expenditures on inpatient services through controlled per diems or global budgets, on the one hand, and controls on physical capacity on the other. Table 5 presents a highly condensed summary of the main cost-control instruments used in the three countries.

Neither of the three countries assigns a significant role to patients in the cost-control process. As already noted, there remains a modest degree of coinsurance in France (Table 5), but its average impact has declined over time. Canada and West Germany have adopted first-dollar coverage as a matter of principle. Although physicians in both nations have occasionally called for cost sharing on the part of patients*, neither consumers nor their legislative representatives have so far shown any inclination to move in that direction.

Just why patients and policy makers in most other nations are so reluctant to embrace the notion of cost sharing and price competition in health care is an intriguing question. Some speculation on this question will be offered in the closing section of this essay. As so often happens in social policy, the issue revolves around a trade-off between equity and economic efficiency.

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*Physicians typically make the case for cost sharing on the arguments that it would elicit more responsible conduct on the part of patients, free medical practice from trivial cases, and contribute toward expenditure containment. There may be something to the first argument and possibly to the second. One doubts, however, that physicians seriously believe the third. Health care providers do not normally favor policies that reduce the aggregate flow of funds to providers. A more plausible explanation for the physicians' posture is that cost sharing, coupled with third-party coverage, will draw more funds to the health care sector than could otherwise be had from third-party payers under universal first-dollar coverage.

Table 5. Dominant elements in the control of health care expenditures.

TARGET	CANADA	FRANCE	WEST GERMANY
	A. EXPENDITURES ON PHYSICIAN SERVICES		
1. Fees	Fairly effective provincial control through negotiated schedules.	Fairly effective control through negotiated schedules that require central government approval.	Negotiated fee schedules with compulsory arbitration, but without requirement of explicit government approval
2. Utilization of Services	Controlled to some extent through monitoring of physician profiles.	Controlled to some extent through monitoring of physician profiles.	Controlled to some extent through monitoring of physician profiles.
3. Supply of physicians	No formal policy to limit supply strictly, although immigration of MD's is discouraged.	No formal policy to limit supply for purposes of cost control	No formal policy to limit supply for purposes of cost control.
4. Cost sharing by patients.	No intention as yet to introduce it formally, although opting out by physicians introduces an element of cost sharing.	There is a modest degree of cost sharing but it is not viewed as a workhorse of cost containment.	No intention as yet to introduce it.
5. Global caps on aggregate outlays.	None	None	It has been attempted in recent years to agree on a total outlay for physician services and prescription drugs ex ante.
	B. EXPENDITURES ON HOSPITAL CARE		
1. Revenues	The individual hospital's revenues are predetermined through budgets that must be spproved by the provincial government.	Control is attempted through negotiated per diems that require the approval of the Departement's Prefet.	Control is attempted through negotiated per diems that require the approval of the state government which can, in principle, set the per diems.
2. Utilization	No direct control.	No direct control.	No direct control.
3. The capacity of hospitals	Controlled through regional planning by the provincial governments which finance roughly two-thirds of capital outlays.	Controlled through regional planning supervised by the central government.	Because capital expenditures are financed by a mixture of state and federal funds, there is authority at the state level to limit capacity through regional planning.
4. Prices of hospital inputs	No direct control.	No direct control.	No direct control.
5. Cost sharing by patients	None.	Virtually none.	None

SOURCE: Reinhardt 1980.

4. THE DISTRIBUTIONAL ETHICS IMPOSED ON HEALTH CARE

Throughout the preceding remarks repeated reference was made to the "consumers" and "producers" of health care and to the "markets" in which they transact. This nomenclature betrays a particular point of view, namely: that health care services are just one particular type of commodity whose production and distribution can be analyzed with the conventional tools of neoclassical economic theory. American health economists typically adopt this view, as do many health policy makers and, indeed, many health care "producers".

Critics of this view argue that health care distinguishes itself from ordinary commodities in a number of ways notably by (1) the consumer's inability to judge the technical quality of health services and (2) the widely shared ethical precept that health care ought not to be rationed among members of society through prices and the budget constraints of individual households. Two observations can be made in connection with the latter argument. First, most nations are not prepared to distribute other commodities -- such as food, clothing, transporation and shelter -- on a strict ability-to-pay system. Health care is but one of many commodities whose distribution is guided in whole or in part by certain egalitarian precepts shared by members of society. But, second, there always rises the question in connection with such commodities: just what degree of egalitarianism needs to be attained to satisfy society's ethical norms?

In connection with health care, for example one can think of three distinct sets of ethical precepts that may be imposed on the distribution of that commodity, namely:

> *The Solidarity Principle* — The treatment a person receives for a given condition should be independent of that person's socioeconomic and political status, and the individual's contribution to any health insurance pool should be based strictly on his/her ability to pay and not on conventional actuarial principles.

The Basic-Needs Principle — Every member of society be guaranteed access to a politically determined minimally adequate set of health care services, but not all technically feasible health care services need be made accessible to all members of society who might potentially benefit from such services, nor need the basic services be made available on equal terms (e.g., with the patient's completely free choice of the provider).

The Extreme Market Principle — The ethical precepts underlying the distribution of health care should be the same as those underlying the distribution of, say, fine wines or shoe laces.

Few, if any, commentators on health policy ever espouse the Marie-Antoinetteism implicit in the third of these principles. We can dismiss it as practically irrelevant. The choice between the first and the second of these principles, however, is not necessarily self-evident. After all, for quite a few important commodities -- food and clothing among them -- most societies happily endorse the basic-needs approach. Must that approach be ruled out *a priori* in connection with health care?

To reflect upon this question, it may be well to bring to view yet other objectives one would like to see a national health system satisfy:

(i) In a market economy, at any rate, one would like to offer the producers of health care as much freedom as possible to conduct their practice as they see fit and to price their efforts as they see fit.

(ii) In any system -- market or centrally planned -- one would like the health care sector to be subject to economic and budget control. ("Economic control" means that costs incurred should be justifiable by benefits perceived. "Budget control" means that actual expenditures should stay within budget levels).

Table 6 arrays these objectives in an analytic grid, along with the presumably widely shared goal that the distribution of health care be as egalitarian as can be. A hypothesis I would like to offer is that a health care system can usually satisfy well only two of the three *desiderata* shown in Table 6, but not all three.

Health care providers would probably always prefer systems falling into the first row in Table 6. These systems would offer them complete economic and professional freedom, and yet allow them to own up fully to the dictates of the Hippocratic oath. Unfortunately, systems of this sort usually do not permit either economic or budget control. Under these systems one literally entrusts the key to the collective treasury to health care providers. The approach is not practical in the long run.

Most nations -- certainly those described in Table 5 -- appear to have opted for systems falling into the second row of Table 6. In these systems, the public debate on health policy tends to be constrained by the Solidarity Principle. Budget control is achieved in large part by severe constraints upon the economic and (occasionally) professional freedom of health care providers who constantly chafe under these constraints.

Price-competitive market systems (the third row in Table 6) can offer health care providers a high degree of economic and professional freedom. Cost control under a system is maintained through competitive health care and health insurance markets, on the one hand, and prices and the constraints of individual household budgets, on the other. In principle, it might be possible to preserve a reasonable degree of equity in such a system through a carefully calibrated degree of cost-sharing in which the patient's maximum potential annual outlay on health care rises in step with ability to pay. In practice, however, even the most carefully constructed price-competitive market system is likely to abandon the Solidarity Principle in favor of the Basic-Needs Principle. Such systems may therefore be referred to as two-tier health care systems (although the

Table 6. Competing objectives in health care: basic prototypical systems that span the set of actual systems.

Desiderata			
Egalitarian distribution	Freedom from government interference in pricing and in the practice of medicine	Budgetary and cost control	Prototypical system
yes	yes	no	the health care provider's dream world
yes	no	yes	a national health insurance system with fee schedules and other utilization review budgetary controls (e.g., Canada, West Germany)
no	yes	yes	a price-competitive market system

bottom tier need not at all imply health care of a shoddy quality).

In the Western market economies, the basic thrust of health policy during the present century has been to move the health system toward an ever more egalitarian distribution of health care (although different routes to that goal were taken by the individual nations). As long as the technical complexity of health care was relatively low, it was relatively easy for a nation to subject the distribution of health care to the Solidarity Principle. A guarantee of access to all "technically feasible, medically necessary health care" did not imply staggering outlays for the individual patient. The slogan that "human life" (really, "human life-years") was priceless was cheap talk, because owning up to the slogan literally was cheap.

In recent years -- especially in the last decade -- the pace of technological advance in health care has been breathtaking. It is now technically feasible to prolong life, often at a reasonable level of the quality of life, although occasionally at staggering cost per life-year maintained. In the United States, sums in excess of $200,000 per year are now expended to prolong the life of individuals. The opportunities to perform such medical miracles will multiply in the next few decades. There will be a plethora of artificial organs -- including the artificial heart. Information about these breakthroughs will be rapidly diffused through the media and incorporated into patients' expectations. In that context, the dictum that "human life-years" are priceless takes on a new meaning, confronting policy makers and systems planners in all nations -- whatever the political system may be -- with troublesome economic and ethical questions.

In the Western economies, policy makers and systems planners have so far sought to evade these ethical questions through the massive application of resources. With the possible exception of Great Britain, most nations have literally smothered the issue with funds. Policy analysts in these countries still dream of a world in which both equity and economy can be assured

through clever tinkering with the system -- be it tinkering with financial incentives (the preferred approach in the United States) or tinkering with systems modeling and outright health sector planning. These efforts are likely to remain vacuous exercises, however, unless they proceed within a consensus on the distributional ethics to be imposed on health care. Systems planners and policy makers must begin there, rather than leaving the matter as an afterthought or just wishing it away altogether.

In the Western market economies, for example, the issue boils down to a trade-off between the attained degree of egalitarianism, on the one hand, and the attained degree of freedom for health care providers, on the other. Strict observance of egalitarianism may sooner or later force policy makers to outlaw a technically feasible but prohibitively expensive medical procedure. The reason will be that a few politically and/or economically privileged individuals ought not to have health care that cannot be given to all individuals who could benefit from such care. Although such a policy might have great political appeal at any point in time, ironically, it would also be apt to stifle experimentation and innovation in health care. After all, there is a steep learning curve in medical technology. Through repeated application a technology that is expensive at one point in time may become relatively affordable at a later point in time.

On the other hand, if a nation seeks to encourage innovation and experimentation by granting health care providers a wide degree of professional and economic freedom, then there is likely to emerge a multi-tier health care system at any point in time. As is well known, in virtually all societies (whatever their political philosophy may be) those individuals who are blessed with high economic and/or political status will tend to do better within a multi-tier health care system than do the less well connected. Such an outcome may offend one's ethical precepts, at least in principle.

Scientists, systems analysts, and policy analysts typically find it uncomfortable to grapple with these issues. These issues are, after all, so indeterminate. My sense, and my point at this Conference, is that we shall ignore these issues at the risk of becoming irrelevant to the process of health policy making.

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SOME GENERAL STRUCTURAL PROBLEMS IN SOCIAL SECURITY

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1. INTRODUCTION

In the last five years people have become more and more concerned with the role that social security is playing in their personal lives and in the economy at large. Although a major proportion of the GNP in many developed countries is now spent on social security, its costs are rising in an uncontrollable way. Our objective in this paper is not to judge this observed growth in terms of "bad" or "good", since our opinion would not carry any more weight than that of any other citizen. Rather, we would like to clarify what social security is and more specifically what its role is in our economies.

Since the beginning of man there has been social security, although it has frequently been called charity: a private responsibility of children to their parents, or the Church to the sick and elderly.

In our developed societies today this task has been transferred to the state. In several respects there has been a tremendous evolution.

(a) Contrary to charity, people are now *entitled by law* to receive social security benefits if they satisfy eligibility conditions.

(b) Social security benefits are no longer financed by voluntary gifts and legacies, but by (mostly) obligatory payments by citizens out of their earned income.

(c) The connection between those who pay and those who benefit has been loosened by the emergence of intermediate agencies, or "third parties".

We will not concern ourselves here with the details in various countries. Obviously regulations vary a great deal between developed countries all over the world, and it would be impossible and senseless to enumerate all those institutional details. The objective of this paper is an analysis of the common structure of social security arrangements. We begin with the definition of eligiblity and the structure of benefits. We then characterize the funding system and deal with the impact of a social security system on the economy as a whole. In the second half of the paper we consider some special problems, which frequently arise and interfere with the working of the social security system and conclude with some thoughts for further research.

2. ELIGIBLITY

In social security matters the world is always divided into three, not always exclusive, groups. They are

(a) the group of those who receive benefits (beneficiaries)

(b) those who pay the benefits

(c) others

In this section we consider the first of those groups. In order to qualify for a retirement pension one has to be over a certain age (e.g., 65), while an additional criterion may be

actual retirement from a job. In order to qualify for unemployment benefits one should be unemployed, in order to obtain disability benefits one should be disabled, etc. In short each arrangement A has its own criterion. The individual i is described by a number of characteristics, say

$$\{x,(i),\ldots,x_k(i)\}$$

and if those characteristics satisfy specific conditions, say C_A, individual i qualifies for benefits. It may very well be that i qualifies for two arrangements A and B simultaneously. Then he may or may not receive benefits from both arrangements.

At first sight this looks like a rather simple system, until we realize that some criteria are not so easily testable. For instance, the testing of such variables as illness and disability to work, or the possibility to find a job for someone presently unemployed may be difficult and costly in practice. In short there is a built-in inaccuracy, which can be improved only if we are willing to increase the screening-cost. But the problem becomes more difficult when we realize that people may have an interest in the outcome of the test and may be able to influence the screening. This implies that we are certain that at least some of those who are qualified after screening are incorrectly declared qualified. You might call it an error of Type 1 in statistical terminology. On the other hand, some people will be disqualified for benefits, an error of Type 2. Obviously, the authorities are trying to minimize both types of errors, although there is frequently a different evaluation of the two errors. Because the person to be screened is frequently a player in the game, we believe that many screening errors will be made.

The most pernicious problem is that most of the variables cannot be seen as *objective* variables, that is, they cannot be measured without the assistance of the person involved. They are definitely subjective, which implies that some individual

responses in theory as well as in practice cannot be verified from other sources. In mathematical-statistical terms we look for the true variable ξ, where we observe

$$x = x(\xi, \varepsilon, \tau)$$

in which ε represents random errors of measurement, and τ the explicit influence of the person who is subject to screening. The number of people of the type x is denoted by n(x).

3. STRUCTURE OF THE BENEFITS

Since the benefit structure varies from country to country, it is difficult to give a general picture of the structures of all benefits in all countries. In general, the benefit b is a function of three types of variables

(a) *eligibility* variables x, e.g., the degree of disability, the number of children

(b) *intervening* variables y, like previous income, income from other sources, previous premium payment, the duration of employment before becoming jobless

(c) a *time* variable t, starting either at the beginning of eligibility or before. For example, many benefits, say unemployment benefits, are only given for a specific time period such as a half year

We may denote the benefit corresponding to an arrangement A as $b_A(x,y,t)$. The nature of the benefits may be of a monetary nature or payment in kind. Examples of the former are:

(1) unemployment benefits

(2) old-age pensions

(3) family allowances

Examples of the latter are:

(1) food stamps

(2) medical services (e.g., in a National Health Service)

(3) subsidized housing

These benefits can be evaluated in terms of money, and in the following pages this will be done implicitly. With respect to the shape of the benefit function b_A, we can say that

(a) The size of benefits is positively related with the eligibility variables x. The more extensive the care, the higher the benefits. Frequently x is measured in terms of a ratio between 0 and 1, e.g., unemployment and degree of disability. In that case b is frequently proportional to x, say $b(x,y,t,) = xb(y,t)$.

(b) The relation with past income may differ considerably. If the benefit is intended to *replace* earned income, we expect to find a profile as shown in Figure 1.

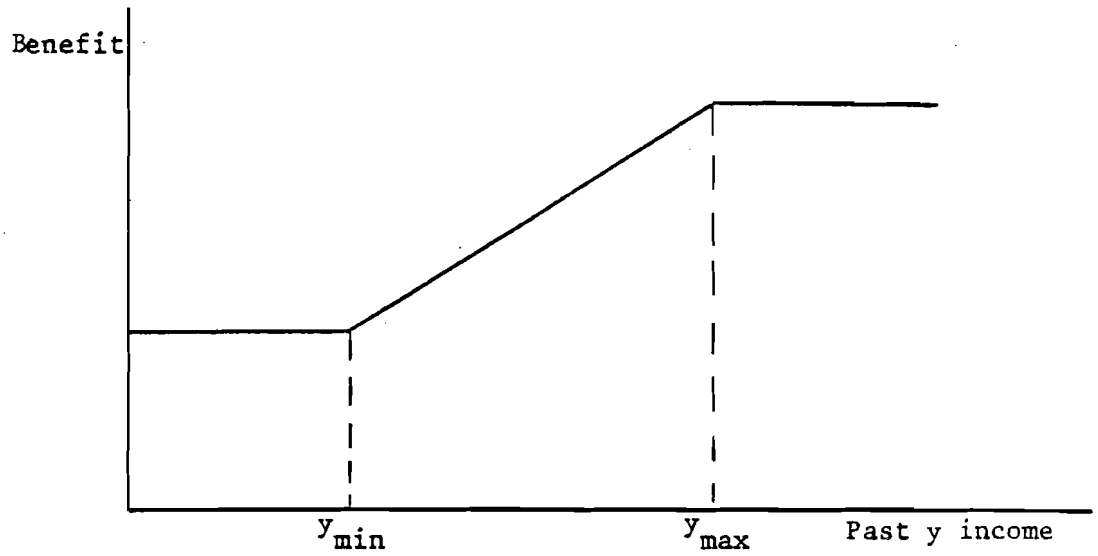


Figure 1. The profile of an income-replacing benefit.

The benefit is frequently related to past earnings, with a lower boundary set equal to the accepted subsistence level in society. Also there is an upper boundary. If the benefit is complementary to existing income, for example in the case of social assistance, housing subsidies, or medical assistance, the profile is frequently just the opposite. People with low incomes receive more in order to sustain a specific welfare level in relation to high-income people.

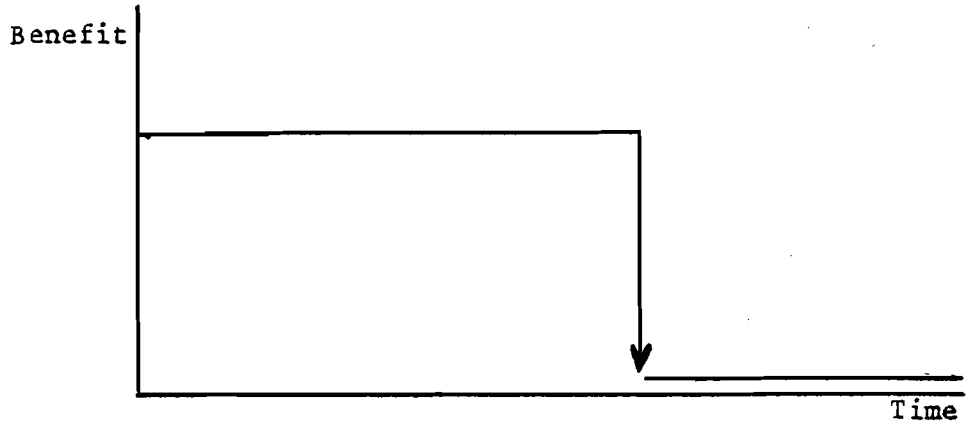
(c) The dependency on time is in general nonincreasing. The profile may be any one of the three sketched in Figure 2. The limited time periods are generally used when it is assumed that the beneficiary is sensitive to incentives to look for work. The unlimited time period is typical for those programs where the individual cannot exert any influence on his own condition, for example sickness, disability, or aging.

Note that some benefit structures are not legally fixed but are flexible in the sense that a civil servant or an authority has to apply some vague rule to the claim. In these cases there is a personal discretionary element involved, which is frequently found in the long-term social assistance assigned to people who did not participate in the labor force.

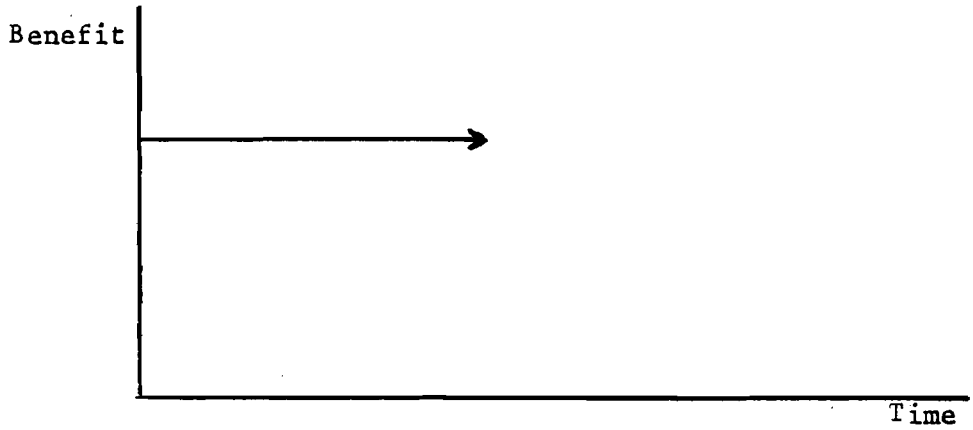
In general we are now able to denote the burden B_A of social arrangement A by multiplying the benefits in the various classes with the numbers in those classes. We have

$$B_A(t) = \sum_{x,y,t_0} n_A(x,y,t_0)\ b_A(x,y,t)$$

where summation takes place with respect to the severity of the case, measured by x, with intervening variables y, and time t_0 being when people began their qualification according to arrangement A. In the same way the whole burden of benefit payments denoted by B(t) is found by summing over all social programs



Constant over limited period



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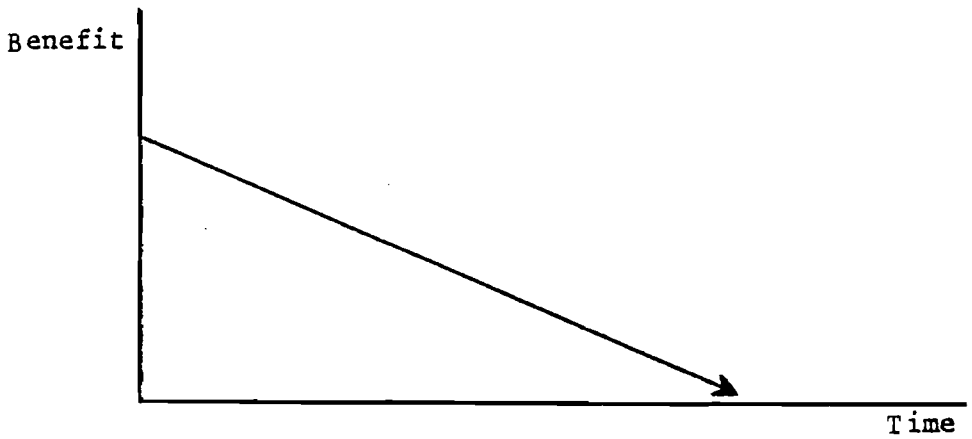

Decreasing over time

Figure 2. Benefit profiles over time.

$B_1(t),\ldots,B_K(t)$. In order to assess the size of the social security system we compare the social security burden to GNP denoted by Y, and we define the *relative social security burden* by $\beta = B/Y$.

4. THE FUNDING SYSTEM

Just as there is a variety of arrangements and benefit structures, there is a whole spectrum of funding systems. The two dimensions of any funding system are:

(1) its divergence from the equivalence principle

(2) its divergence from the pay-as-you-go-system

Equivalence

The classical system of hedging for calamities is clearly the private insurance model as used, e.g., for fire insurance or car accidents. The value of the expected monetary risk is actuarially evaluated and someone may buy the insurance for that price. If this equality holds there is *equivalence* between the price of the insurance and the value of the service rendered. Nevertheless, to be insured is advantageous for the individual as he is unable to pay for the calamity, if it occurs, from his own income, while the insurance company, thanks to the Law of Large Numbers, can. Since all risks differ, theoretically this calls for an insurance premium that is *differentiated per individual*. Practically it would cost a great deal to make such a detailed risk assessment; hence tailor-made insurance is rare and uniform packages are the rule.

Even private insurance does not wholly conform to the equivalence principle. Some policy buyers tend to get more for their money than others. There is a hidden transfer where low risks pay the coverage for the high risks. In private industry insurers cannot deviate too far from the equivalence principle, because then a competitor would offer the same insurance but

for less money to the relatively low risks. The low risks would "crowd-out" from the clientele of the first company leaving them with the necessity to increase the insurance premium for the high-risk stayers. However, as the stayers are also varying in risk the same process would continue, until all clients have left the non-risk-differentiating company.

Any divergence from the equivalence principle might be called a solidarity element. From the above analysis it is evident that divergence is penalized in a free market situation and is consequently unsustainable. Any solidarity element that remains is simply due to the impossibility of a good detailed risk-assessment. It follows that any solidarity in an insurance arrangement can only be sustained if people are not free (or would be highly penalized), to leave the group of insured after having entered it. This is certainly the case of health insurance where younger families tend to be low risks and subsidize the older families in the same insurance. Here, solidarity results from the fairly low age barrier, except if the customer is willing to pay a higher premium. However, only insurance can have a solidarity element. If the subgroup involved is obliged to pay a premium, we then speak no longer of insurance but of social security.

Pay-as-you-go-system

We say that the social arrangement is a pay-as-you-go-system if the burden in year t, say B_t, is covered by the premium revenue of that year, say P_t. (The premium may be paid either by the potential beneficiary or by his employer, however, this detail is not considered in this section.)

The pay-as-you-go solution seems acceptable if the *relative social burden* B_t/Y_t is *stable* from year to year.

This is the case either when the absolute burden *and* national income are stable over time or if both change at the same rate, when there is an inflation rate of α percent and if

the social benefits are for 100 percent corrected for inflation, numerator and denominator increased by a factor $(1 + \alpha)$ per year.

The same holds if there is no inflation but an income increase because of productivity increase, in which case social benefits are allowed to profit from productivity increase, *provided* that they would not have changed otherwise. This is frequently an unrealistic assumption. If productivity increase is caused by the substitution of labor by capital, it implies an increase of the unemployment rate and thus an increase of B_t at fixed tariffs, even without any productivity linkage of unemployment benefits.

If, however, our aim is to stabilize the premium burden P_t, the pay-as-you-go-system may bring us into difficulties.

A specific and very painful example is the one posed by the *aging problem*. The relative burden corresponding to an old-age pension plan B/Y depends on the ratio of people over 65 years to people below that age.

If that ratio tends to increase due to a fall in the birth rate, it implies an increase of B/Y. This increase is not along a straight line but rather along a curve reflecting the demographic echo-effect. Obviously, if B/Y tends to a new and higher stationary value, then this will be reflected in a higher premium burden P/Y. It is evident that by levying a somewhat higher premium than necessary in the first years, the system may build up some capital, thereby easing the way up the hill. Generally, predictable evolutions and fluctuations (in employment) should not be dealt with by a complete pay-as-you-go-system, but the behavior of B/Y should be flattened by the amount of investments made from a premium, which is as stable as possible. This raises the question whether a pay-as-you-go-system is a very good system for all arrangements. It does not seem to be so if we face heavy fluctuations or changes in the premium, because the solidarity element may become burdensome. This is particularly clear when looking at the aging problem. If the younger generation in 1960 paid a reasonable amount of pay-roll tax to support the elderly,

they would like to have the same support when they are old in 1995. In such cases it might be preferred to have a capital formation system where a personal title is built up, although certainly no solidarity is built in. Also mixtures of the two systems can be envisaged. However, the two main advantages of the capital-formation system are two other factors:

(a) the accruing interests accelerate the built-up of capital and so the premium is *lower* than under the pay-as-you-go-system

(b) the capital has to be invested and this implies a source of capital supply, so badly needed nowadays

Coverage from Government Revenue

The extreme of a pay-as-you-go-system, but not different in essence, is the system where social security benefits are paid straight from the tax revenue. If it is difficult to assess the benefit burden and if it is supposed that the burden will be small anyway, we frequently find that no separate social security premium is levied but that the social security benefit is simply paid as a part of governmental expenditures. In general, the cost-awareness for those programs is minimal as nobody thinks he has to pay a premium. In reality each citizen pays his share via taxes. Although it is not precisely clear who pays what part, it is quite evident that for an additional arrangement the burden will be shared by tax-payers according to their marginal tax rate. If taxes are not raised as the social benefit burden grows, an increased burden requires either a cut in other government spending or a budget deficit. One of the reasons for deficits in so many countries is the arrangement sketched above. Government cannot drop its responsibilities simply because its payments for social benefits are increasing so rapidly. Clearly in this respect a pay-as-you-go-system where a rising benefit burden is straightforwardly turned over to the premium payer is preferable from a cost-containment viewpoint.

5. FITTING IN SOCIAL SECURITY IN THE ECONOMIC SYSTEM

One of the traditional misconceptions, at least until recently, is that a social security system has no influence on the behavior of other economic variables such as price level, unemployment rate, GNP, or capital investment. The idea that social security is just a transfer of money from premium payers to benefit receivers with no additional consequences has to be rejected. Let us start with a close consideration of the *pay-as-you-go-system.*

In the case of non-voluntary enrollment, it may be safely assumed that people who have to pay a premium change their behavior. The subjects who are mainly involved are the *potential beneficiary* and in many instances his employer.

The difficulty with most social security premiums is that the worker is actually made to buy something (a kind of insurance) at a prescribed price. Everybody is annoyed when he *has* to buy something. When a person cannot choose the best bargain or make the choice to buy nothing, he becomes frustrated. This is especially true if he underrates the commodity as people tend to do in the case of social security since they are usually overly optimistic that calamity will not strike them or that the time of retirement is still far off.

Individuals are frequently inclined to concentrate on their net disposable income as their measure of material well-being, forgetting almost completely about the value of the money that is withheld for social security. It follows then that any increase of social security premiums seems likely to reduce the motivation to work. This tendency is reinforced the higher the unemployment, sickness, and disability benefits are and/or the higher the *health* cost coverage is. Obviously this view will not earn a lot of applause from those people who have an idealistic image of mankind; however, reality gives ample and deplorable evidence to the contrary.

The employer is not happy with the burden of social premiums, mostly proportional to the wage sum he has to pay. Basing his

hire-and-fire-policy on a comparison of marginal revenue per dollar of labor cost, it is obvious that an increase of labor cost, caused by a rising social security benefit, makes the hiring of workers less profitable. For the worker who just earns his wage, as classical theory prescribes, an increase in labor cost will cause the layoff of this marginal worker, either by firing or, if law forbids that, a layoff under the legitimizing cover of disability. As capital inputs are not taxed by social security premiums, it is implied that the relative price of labor is rising in relation to capital causing a substitution of labor by capital. Moreover, an additional demand for capital and an upwards thrust of interest rates is also implied. This additional input of capital will increase labor productivity, mitigating the layoff effect as outlined above.

As workers are pushed out of the work force, both by their employer and/or by their own will, a reduction of GNP or its monetary equivalent, national income will result.

If we like to keep consumption unchanged, considering the well-known Keynesian identity $Y = C + I + (E - M) + G$, one or more of the following effects are implied:

(1) a reduction of capital investment

(2) a balance of payments deficit

(3) a cut in government spending

(4) an increase of the national debt

(5) an increase in the money supply with the well-known inflationary effect

All of these problems are currently found in present societies. Obviously social security is a treasured good, but it has some disadvantages as well.

Coverage out of Taxes

The previously described effects of social security hold mostly for government financed social security systems, which have the advantage of the tax burden not being observably

discriminating against the labor input of the firm. Its disadvantage is that cost-awareness is more difficult to maintain. The easy solution is a government deficit with the resulting inflation and/or interest burden on the government debt.

The Capital-Formation System

The capital-formation system to finance social security is certainly the oldest system. Some of its definite advantages are that the premium revenue changes from consumer expenditures to *savings*, implying that there is an additional source of investment capital, although part of it is offset by the amount that would be saved in any event. The interest-mechanism makes the build-up of capital easier. Another feature that may be concurrent with the system but not necessarily so, is that each potential beneficiary receives a personal entitlement on the capital saved for him. In practice there are many problems caused by job mobility resulting in a switch from one pension fund to another. Obviously when personal property has been accumulated, divergence from the equivalence principle seems impossible. The adverse changes in the factor prices of labor and capital inputs and the resultant demotivation of workers and employers by the payment of SSP remains. Because risks are to a certain extent influenced by the insured himself, it is somewhat difficult to fix the premium on actuarial arguments alone with the exception of old-age pension insurance.

6. THE DYNAMICS OF SOCIAL SECURITY

The major problem of present social security systems seems to be their *immanent dynamic instability*. This dynamic property seems to be first signalled in Van Praag and Halberstadt (1978) and later on elaborated in Van Praag and Emanuel (1981). Given the fact that wages of workers are never proportional to their marginal productivity, as neoclassical economic theory postulates, for any wage structure there will be workers that are unattactive to hire, as they do not earn the marginal costs as a result

of their employment. They are called non-employable at the given wage rate. So, even in a state with no social security, there would be unemployment. After introduction of a social security arrangement to pay benefits to the people who are non-employable, either as a result of a labor disability or illness or unemployment, it follows that the benefit burden has to be paid. Under a pay-as-you-go-system it will be financed to varying proportions by the employers and the employee. The impact on the employer is that it increases wage costs. The result is a partial layoff of labor increasing the number of non-employables and an increase in the premium burden to the employer in the nesting period. A second layoff follows, and so on.

A similar impact will be exerted on the workers. The increase of their payroll tax will act as a disincentive to participation in the work force, especially if the gap between benefit and net wage is not so large. It follows that also the worker's reaction will yield an increased unemployment in the next period, resulting in a higher worker's premium level.

As a result the system sets a dynamic process in motion, which may or may not converge to an equilibrium. Numerical simulations with a simple quantitative model show that the nature of the outcome is rather sensitive with respect to the specific parameter values used. It appears that the possibility of no equilibrium existing at all in the sense that the active employed population shrinks to zero, cannot be excluded. Obviously, in reality such an undesirable evolution will not last long as this emergency will be countered by emergency political measures. Those measures will then certainly include a reform of the social security system, which may entail a reduction in benefits.

It may be thought that this phenomenon is only present when social security programs are structured on a pay-as-you-go basis. However, the same phenomenon is possible in a system where social security benefits are financed from general revenues

collected from various tax sources. Also, when social security benefits are financed from general revenue, there will be non-employable people given the wage structure, and the resulting benefit burden implies an increasing tax burden. This additional tax may be levied as a corporate tax, income tax, excise tax, or any other tax combination. The *general* result will be that industrial activity will be demotivated. However, in particular sectors such as the production of inferior goods sector (or Giffin-goods), activity may be increased. It follows that the demotivation of industrial activity will lead to a new lay-off of labor (and capital), implying an increase in the social burden. This necessitates a new tax increase, and so on.

Short-term solutions are feasible. The first idea is of course to finance the increasing burden by a budget deficit, financed by state bonds or loans, or straightforward money creation. Obviously this causes inflation and a rising interest burden, which in the long-run is impossible to support. Another way is simply to ignore non-employability and to keep the potential beneficiaries at their jobs as much as possible. Obviously this policy is impossible for private firms but state-owned enterprises can do it, in which case there will be a state subsidy to the firm that is paid out to the really non-employable part of the labor force. There is hidden non-employability and part of the paid wages are really hidden social security benefits.

Non-employability is clearly a relative concept. It depends on the prevailing wage rate. A person who is non-employable at a wage of $2000 may be employable for $1000. If a state-firm pays this worker $2000, it implies that he would be paid $1000 for his work *plus* $1000 hidden social benefits. In the West the remaining productivity would not be used and the individual would get $2000 in benefits without any additional effort. It follows that a social security system of this type may be cheaper than the normal Western type. However, in Holland, the USA, and other countries, there are "protected factories" for physically and mentally handicapped where the wages of the commercially non-employables are subsidized by the state.

7. INFLATION AND WAGE INDEXATION

One of the major advantages of a pay-as-you-go-system compared with private insurance, social insurance, or a capital-formation system is its immunity to inflation. If prices increase 10 percent, and nominal incomes increase by 10 percent, there is no problem to increase benefits by 10 percent as well. In many countries this is an automatic procedure. The real social burden will not change. However, is this immunity beneficial from a macroeconomic point of view?

The price-index linkage of wages and benefits is evidently a factor that sustains the upward surge of prices. A major cause of the worldwide inflation in the last decade is certainly due to the automatic inflation correction built into wages and the social security structure. Inflation is certainly detrimental for people who save money or invest their funds in nominal accounts, bonds, non-indexed life insurance, or annuities. Therefore, inflation has an unfavorable effect on investments intended for old-age pensions, but will have a favorable effect on a security system structured as a pay-as-you-go basis. As inflation has an important and negative impact on the country's position in international trade, we may infer that the price link will also have a negative effect on the external position of the country, bringing more people on the dole. We suspect that price indexation increases the imminent instability of the system.

Wage indexation is aimed at linking social security benefits with the real wages of the employed in the private sector. This type of linkage is a risky affair.

The reason for such a linkage is that the long-term rise in labor productivity and the subsequent increase in real wages would be shared by the nonactive population. The linkage of social security with increases in real wage is based on feelings of solidarity in the sense that the nonactive population should share in the economic growth of the economy. However, it raises several problems.

(a) What if real wages decrease? It would be a difficult policy to *reduce* social benefits. It follows that there is a strong tendency to deal asymmetrically with social security indexation. If real wages increase, real benefits increase accordingly. If real wages fall, then real benefits remain constant by linkage to the price-index. This option is especially popular as social beneficiaries are in a weak political and economic position. It is obvious that such an asymmetric policy would enhance the system's instability.

(b) The rise in labor productivity is frequently due to automation or the introduction of new technology. Automation is often preceded by expenditures to new investments. It follows that the investment may well lead via wage increases to an increase of social benefits, and hence an increase in the employer's contribution to the program. Obviously this demotivates investment activity, except for the labor-substituting type in order to reduce the increasing social premium burden. However, if labor is replaced by capital, the social benefit burden will increase.

(c) By tying the level of social benefits to real wages in the private sector, we run the risk of a relatively small and decreasing number of privately employed workers determining the course of social security benefits. For instance in Holland the number of workers in the private sector is about 3.5 million, while the number of workers in the state sector is 1 million and the number of beneficiaries is 3 million (i.e., those who fully depend on social security).

The solidarity argument is strong if there are only a few beneficiaries compared with private sector workers. However, the argument loses its value if the number of beneficiaries grows larger and larger.

Summarizing this section, we believe that indexation of social security benefits to either prices and/or wages destabilizes the system, although it does not necessarily imply that the system will explode.

8. CONFLICTING INTERESTS, THE POLITICAL DILEMMA

In the previous pages we studied the social security phenomenon from an economic standpoint. In this section we want to consider the issue from a political dimension.

It cannot be denied that the mass of beneficiaries in a country have one common interest: maintaining or, if possible, improving their social security benefits. As such, they have as their natural adversary those workers who earn a primary income. These same workers are also the source of income for the beneficiaries, but this does not imply a deep feeling of gratitude among the beneficiaries. On the contrary, there is a considerable chance that the beneficiaries will cluster together, based on their joint interests, in a political party. A new class struggle might result between those with a primary income and those without one.

It is clear that such a political party may be one that already exists such as a socialist or leftist party, a fascist party, or one that will be newly founded. In a democratic multiparty system this implies that such a group of "have-nots" may become a powerful party indeed. Since many members of other parties may be future beneficiaries as well, it follows that also the others may be included to sympathize with the objectives of the beneficiary party.

As we have attempted to point out in the previous pages, the existence of social security programs in an economy is a destabilizing factor in the economic system as a whole. It implies that there is a probability but not a certainty that the system will explode because of a crowding-out phenomenon. Hence, it is both in the interest of the workers and the beneficiaries to keep the size of social security benefits modest

so that the hen with the golden egg is not killed. On the other hand, a beneficiary party would be tempted to increase the scope and magnitude of the social security system to attract more votes. Therefore, in addition to the economic instability caused by a liberal social security system, there is a political destabilizing factor. Consequently, it is doubtful whether a consistently more comprehensive social security system can last for decades without an uprooting of the economic system as a whole.*

The previous remarks refer to multiparty systems. It would, however, be shortsighted to restrict ourselves to those state systems. In a one-party system it may be more difficult for beneficiaries to voice their interests. However, it may be feared that in such a system there comes a time when the beneficiaries will fight for their interests using nonparliamentary means. In both cases a dialectic process ending in a revolution may not be improbable.

9. THE RETIREMENT PROBLEM

In this section we shall become somewhat more specific by considering a special social program. The eligibility criterion is *age*. The structure of such a program is that the young pay contributions to support the old who get an old-age pension. The age limit is set at 65, although it may vary from between 50 to 70 among programs.

For such a system a critical variable is the dependency ratio, that is the proportion between the old-aged $A_t(65)$ and the working population $L_t(65)$. The ratio A(65)/L(65) depends

*At this point as an interruption we have to consider the Keynesian idea about social security. It is frequently thought that social security is a stabilizing component as it would uphold effective demand in the downswing of the business cycle. However, this is only true if the marginal propensity to consume would really differ between high and low income errors. Given the fact that the class of self-employed is vanishing and that most private savings of workers are by means of obligatory pension contributions, it is clear that this stabilizing influence is minor.

on the demographic age distribution. If the birth rate β and the death rate δ are constant, we call the population in stationary growth. In such a situation the dependency ratio is a decreasing function of the birth rate and the death rate.

If the birth rate falls, it implies that the long-term dependency ratio will increase. However, before coming into its new growth path, there will be a transition period during which time there will be some overshooting. The behavior is sketched in Figure 3, where the path from the initial ratio at level 1 to the eventual ratio at level 2 is sketched.

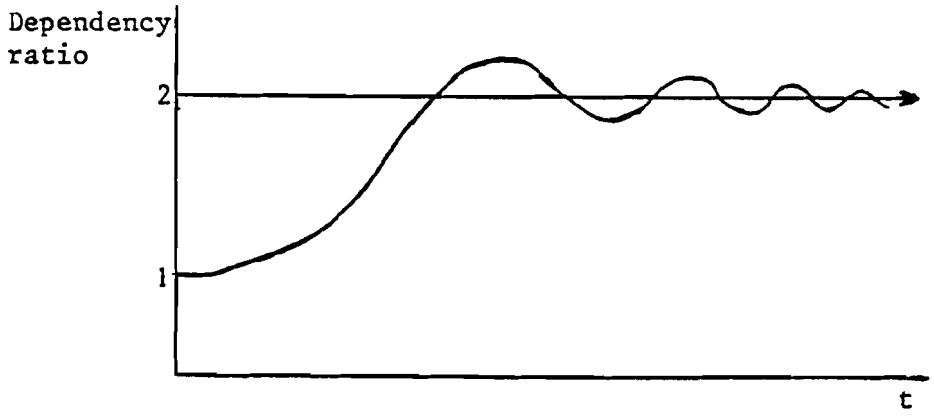

Figure 3. The behavior of the dependency ratio.

If the pension rate is r, the pay-as-you-go-system determines the pension contribution to be π where

$$\pi = \frac{A(65)}{L(65)} r$$

It follows that for falling birth rates the contributions of the working population have to increase, and quite considerably, in order to support the aged at the previously fixed level δ.

The problem is aggravated during the transition period, which may for practical purposes be evaluated by several decades.

We have assessed that for some countries pension contributions may have to be doubled. This poses a problem to intergenerational solidarity. In the years ahead, and around the year 2000, the aged will feel justified in obtaining the same pension that they were able to give their fathers. However, the then working generation feels only an obligation to pay the contribution their fathers paid. Logic suggests three possible solutions:

(1) a fall of the benefit level

(2) a rise of the premium

(3) a redefinition of "old-aged", e.g., by setting the retirement age at 67

The problem is not solved in practice, although the US policy seems to tend to the final solution. The problem is, however, the number of jobs. If more people of the older generation stay on the job, the unemployment problem will be aggravated for those who enter the labor market.

A second problem is that the retirement age definition is based on the fact that many people of 66 are unable to work, although as a rule of thumb it is not a very accurate criterion and may be unjust in some individual cases. Therefore an increase in the retirement age may be tantamount to a deterioration in the quality of the labor force, and this policy may force some firms to employ people who contribute less than the value of their wages to the firm.

The problem of employment does not appear to be much of a problem. Undoubtedly there will be transition difficulties, but we do believe in the Law of Say in the sense that new jobs will create their own demand. However severe problems may appear to be in the short run, they will have a tendency to work themselves out in the long run.

The second problem appears to be much more critical. In my opinion the retirement age should be a variable, determined by medical examination and other relevant factors. It might well be that retirement is a gradual process in two respects.

The wage of old-aged may be gradually replaced by social security benefits *and* the time the elderly spend on their job may gradually fall from full-time to part-time, and eventually to no-time. In this way the retirement problem may be smoothly solved.

10. THE SOARING HEALTH COST PROBLEM

One of the more important problems in social security is soaring health costs. They are covered in most countries by social security, although there is a tremendous variation in the specific modes of financial coverage. In most developed countries the share of health costs has risen to about 10 percent of the GNP. This evolution raises several questions. First, what are the reasons; second, are they reasons for panic; third, is it likely that the growth will continue; and fourth, how do we counteract this trend?

The main reasons for ever increasing health costs seem to be the following:

(1) Medical technology has expanded tremendously in the last century and hence its cost.

(2) Due to that expansion we have undone part of the Darwinian principle of the "survival of the fittest". Although the present health status of the population has been improved compared with the past, most of us will have survived major illnesses and operations, which would have killed us in the past. The genetic health quality of the adult population may be worsened.

(3) A considerable part of our health costs is certainly caused by smoking, alcoholism, and other unhealthy consumption habits.

(4) In our present-day society, *medical legitimation* is a condition for disability or sickness benefits, even if people have other reasons for quitting their job. This holds especially for psychosomatic diseases and psychiatric treatment. It follows that the medical profession is partly used for improper purposes.

(5) A final reason for soaring health costs is the monopolistic supply behavior of the medical profession and health insurance companies. In many countries there is a medical cartel that can supply and sell its products without any difficulty and fix its prices at the level it wants.

A solution to the latter problem is a market reform that should entail:

(1) a greater supply of medical education

(2) more competition among doctors and more competition for job vacancies where there is a demand for doctors

(3) a strong control by outside agencies to represent the interests of the patients

Having enumerated the reasons of the growth of health care costs, it is clear that there is no reason for panic. It is just one of the costs of our rising welfare. It is our assessment that the growth in health care costs will be slowed in most countries at the present level or at less than the present level. The ways in which we may try to dampen this growth is now clear as we have suggested in points (3), (4), (5) above, that is to say:

(1) Consumption habits should be improved. This may be done in a dictatorial way. However, a more democratic way seems to be to charge the *real* costs for that type of consumption. For alcoholic beverages it implies that not only the production cost should be paid but also a surcharge to cover the future additional health care costs *plus* the production losses incurred by prematurely quitting the labor force.

(2) The doctor's role as controller to legitimize the wish for leisure, and social security benefits, should be transferred to non-medical agents.

(3) Ways should be found to reorganize medical markets. One interesting way seems to be the Health Maintenance Organization (HMO) where a medical organization comprising hospitals and general practitioners receives a fixed amount per year to keep a person in good health. The reward is totally unrelated to medical production activities, but only to beneficial outcomes.

11. CONCLUSION AND FINAL REMARKS

At this point it will be evident that the scope of the social security is enormous. By definition it does not conform to market forces, and it seems to be ridden with potential and imminent instability. Whether the system will get out of hand or not is not easy to determine. It depends on the specific constellation of parameters combined with the behavior of various parties, especially employers and employees. But there can be no doubt that the increase in the size of social security systems has an impact on the whole economic system and that this impact will be in the direction of crowding-out. In addition, there is the risk of a total collapse of the economy if the social security is of sufficient magnitude.

(1) Therefore our research priority should be to: *investigate the general structure of social security systems and determine the demarcation line between stability and instability.* (This can be done to a large extent by means of a simulation technique.)

(2) Study in detail the choice between capital-formation, pay-as-you-go, and government coverage.

(3) Obtain empirical evidence on the behavior of changing social security systems. It seems advisable to make international comparative studies. Countries can serve as different observations in a world laboratory.

(4) Collect micro-data on the behavior of parties involved. For instance we may study:

(a) the production functions in various countries to determine the firm's reaction on wage cost changes

(b) the reaction of labor supply as a function of net wages

(c) the productivity of individuals as a function of age

(d) the medical consumption behavior of patients under various insurance regimes

(e) the supply behavior of doctors under various financial regimes

We do not believe that policy should wait for research results. If an emergency arises as has been the case in some countries, measures can then be taken that lead in the right direction. Such measures should be considered *preliminary*; they should be modified according to new research results as they become available.

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HEALTH CARE OF THE ELDERLY

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1. INTRODUCTION

The topic "Health Care of the Elderly", which has become the focus of intense interest in the United States and elsewhere, deals with both health care and the elderly. Concern about health care has centered on the rapid and sustained rate of increase in expenditures that has occurred over the past two decades; concern about the elderly has centered on our rapidly aging population and the implications of this demographic shift on a whole range of public programs, of which health is only one. Both subjects have recently received considerable attention through such meetings as the World Conference on Aging sponsored by the United Nations this past summer and the American Public Health Associations meeting held only a few weeks ago with its theme "International Perspectives on Aging". What I will do in

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this paper is briefly review some of the vast amount of information on this subject, which has recently become available. The data will be almost entirely from the US but occasional reference will be made to the similarity of experiences with other industrialized countries.

2. HEALTH EXPENDITURE PATTERNS

Total expenditures on health care in the United States, expenditures per capita and health care expenditures as a percent of gross national product are shown in Table 1. Several points are clear from the table. First, expenditures increased substantially during the period 1965-1981, from $42 billion to $287 billion. Second, most of this growth has little to do with any absolute growth in population since the growth in expenditures per capita is only slightly smaller than the growth in total spending, from $211 to $1,225. Third, health care expenditures have been growing at a more rapid rate than other sectors of the economy. Health expenditures as a percentage of GNP has grown from 6 percent in 1965 to 9.8 percent in 1981. Furthermore, there are no signs that this differential growth rate is abating. From 1980 to 1981, total health care expenditures increased by 15.1 percent, whereas the overall GNP increased by 11.4 percent and in this respect there is little expectation that 1982 will be much different.

There are a variety of reasons that have been given to explain the rapid increase in health care costs in the United States. One reason frequently cited is our mostly private system of health insurance with its primary reliance on fee for service medicine. While there are numerous studies supporting this hypothesis, casual observation of the European experience suggests that it is more than just the institutional peculiarities of the US that are responsible for the rise. Table 2 shows expenditures for medical care as a percent of GNP for several other countries. It is obvious from these figures that the US is not alone in experiencing a rapid growth in health care

Table 1. US national health expenditures, 1965-1981.

	Total expenditures (in billions)	Expenditures per person	Expenditures as % of GNP
1965	$ 41.7	$ 211	6.0%
1966	46.1	230	6.1
1967	51.3	254	6.4
1968	58.2	285	6.7
1969	65.6	318	7.0
1970	74.7	358	7.5
1971	83.3	394	7.7
1972	93.5	438	7.9
1973	108.2	478	7.6
1974	116.4	535	8.1
1975	132.7	604	8.6
1976	149.7	674	8.7
1977	169.2	755	8.8
1978	189.3	836	8.8
1979	215.0	938	8.9
1980	249.0	1,075	9.5
1981	286.6	1,225	9.8

SOURCE: Pear 1982.

Table 2. Expenditures for medical care as a percent of gross national product, selected countries, 1969 and 1975.

Country	1969	1975
Canada	7.3	7.1
France	5.7	8.1
Netherlands	5.9	8.6
Sweden	6.7	8.7
United Kingdom[a]	4.8	5.6
West Germany	5.7	9.7

[a]The United Kingdom includes Great Britain (England, Wales, and Scotland) and Northern Ireland.

SOURCE: 1969 data from Simanis 1973, p. 39
1975 data supplied by the Social Security Administration. Cited in Pechman 1980, p. 187.

expenditures. A second reason often cited is the continued introduction of new and expensive medical treatments and technologies, particularly in the absence of explicit or implicit strategies for rationing these technologies. A third reason and one of particular concern to this paper is the existence of a rapidly aging population. This, again, is not a phenomenon unique to the United States. As shown in Table 3 many European countries are already experiencing what the United States is expected to encounter in the near future.

That an aging population can have profound implications on the use of health services and the costs associated with the use of these services is shown in Tables 4 and 5. Table 4 shows that the elderly are hospitalized 50 percent more often than the general population, stay 50 percent longer, have almost 50 percent more physician visits and use twice as many prescription medicines (not shown in Table 4). Similarly the aged account for a disproportionate share of the expenditures on health care. Persons aged 65 and over comprise 11 percent of the population but account for over 29 percent of all health care expenditures (Table 5). In per capita terms, the aged spent $2026 billion: 2.5 times the amount spent by those 19-64 and 7 times the amount spent by those under age 19. There is also something unique about the health utilization patterns of the elderly not implied by Table 4, which is likely to become increasingly important in the coming decades—their use of nursing home services. Unlike other age groups, nursing home care followed hospital care as the second most expensive health item for the aged. It accounted for about 25 percent of the expenditures for this group or about $518 per capita (Fisher 1980). For all other age groups, physician services represent the second leading expenditure category. Given the use and expenditure patterns outlined above, it is clear that a changing age structure in a population can severely affect its expenditures on health services.

Table 3. Population age 65 and over as a percentage of total population, selected countries.

Country	1957	1960	1963	1966	1971	1974	1977
Austria	11.7	12.2	12.8	13.4	14.3	14.8	15.3
Belgium	11.7	12.0	12.4	12.8	13.5	13.8	14.0
France	11.5	11.6	11.8	12.3	13.0	13.3	13.7
Germany, Federal Republic of	10.4	10.8	11.5	12.2	13.4	14.1	15.0
Netherlands	8.6	9.0	9.4	9.7	10.3	10.7	11.1
Sweden	11.2	11.8	12.3	12.9	13.9	14.8	15.6
Switzerland	9.9	10.3	10.3	10.7	11.5	12.2	13.7
United Kingdom	11.5	11.7	11.8	12.1	13.2	13.8	14.3
United States	8.9	9.2	9.4	9.5	9.9	10.3	10.8

SOURCE: Special Committee on Aging, United States Senate.

Table 4. Percentage of persons hospitalized, days per patient, physician visits, and prescriptions per capita, noninstitutionalized persons by age group, 1978.

Age group	Percent of persons hospitalized	Short-stay hospital days per patient	Physician visits per capita	Prescriptions per capita (1973)
All persons	10.4	9.7	4.8	—
Under 17	5.3	6.4	4.1	3.2
17-24	10.6	5.8	4.3	4.2
25-44	11.3	7.3	4.7	5.6
45-64	12.1	12.3	5.3	8.7
65 and over	18.0	15.6	6.3	14.4

SOURCE: Fisher 1980, p. 67.

Table 5. Distribution of population and of personal health care spending by age group, 1978.

Age	Health care spending (in billions)	Population (in millions)	Per capita spending	Percentage Distribution	
				Health care spending	Population
All ages	$167.9	223.0	$ 753	100.0%	100.0%
Under 19	19.9	69.5	286	11.9	31.2
19-64	98.7	129.2	764	58.8	57.9
65 and over	49.4	24.3	2,026	29.4	10.9

SOURCE: Fisher 1980, p. 66.

3. DEMOGRAPHIC PATTERNS

The population of the United States, as well as the population of many European countries, is aging rapidly. This increase in the amount of elderly people is occurring in both absolute and relative terms. It is also reflected in an increasing dependency ratio—that is the ratio of those in the "dependent" 65 and older population to those in the "supporting" 18-64 age group.

Numbers of Older Persons

The absolute number of older persons is one important factor in the prediction of age-based health utilization. In 1930, the US population 65 and older numbered 6.6 million; by 1980 it had increased to 25.9 million. During the period 1930-1980, the increase in the elderly population was 292 percent, whereas the increase in the total population was only 89 percent.

Table 6 shows the number and distribution of persons by age and sex from the period 1960-2080. The total population in the US is projected to increase from 232.7 million in 1980 to 365 million in 2080. The population over 65 is projected to increase from 25.9 million in 1980 to 75.9 million in 2080. During this period, the differential increase in the elderly population relative to the total population is even greater than it was during the 1930-1970 period, 193 percent versus 57 percent, respectively.

The number of the "old" elderly has also increased rapidly. From 1960-1980, when the overall elderly population increased by 55 percent, persons 75-84 increased by 65 percent and those aged 85 and over increased by 174 percent. This trend is expected to continue. Whereas the overall elderly population is projected to increase by 193 percent between the years 2080 and 1980, the 75-84-year-old population is projected to increase by 210 percent and the 85 and over age group by 595 percent.

Table 6. Number and distribution of persons by age and sex: United States, 1960-2080.

Age and sex	1960	1980	2000	2020	2040	2060	2080
Total				Number in Millions			
All ages	183,216	232,669	273,949	306,931	328,503	344,816	365,090
Under 20 years of age	70,828	74,045	77,001	80,376	84,234	88,860	93,498
20–44 years of age	59,216	87,145	98,261	97,345	102,160	107,730	113,349
45–64 years of age	36,466	45,587	62,435	76,557	74,853	77,898	82,308
65 years and over	16,706	25,892	36,252	52,653	67,256	70,328	75,935
65–74 years	11,094	15,627	18,334	30,093	29,425	32,433	34,175
75–84 years	4,671	7,688	12,496	14,909	24,565	22,396	23,861
85 and over	941	2,577	5,422	7,651	13,266	15,499	17,899
Male							
All ages	90,513	114,069	133,798	149,538	158,833	166,923	176,811
Under 20 years of age	35,957	37,807	39,334	41,067	43,045	45,416	47,793
20–44 years of age	29,126	43,754	49,424	49,063	51,513	54,346	57,205
45–64 years of age	17,852	22,086	30,592	37,616	36,935	38,484	40,710
65 years and over	7,578	10,422	14,448	21,792	27,340	28,677	31,103
65–74 years	5,168	6,819	8,250	13,779	13,559	15,050	15,943
75–84 years	2,043	2,838	4,741	5,907	9,895	9,180	9,865
85 and over	367	765	1,457	2,106	3,886	4,447	5,295
Female							
All ages	92,703	118,600	140,151	157,393	169,670	177,893	188,279
Under 20 years of age	34,871	36,238	37,667	39,309	41,189	43,444	45,705
20–44 years of age	30,090	43,391	48,837	48,282	50,647	53,384	56,144
45–64 years of age	18,614	23,501	31,843	38,941	37,918	39,414	41,598
65 years and over	9,128	15,470	21,804	30,861	39,916	41,651	44,832
65–74 years	5,926	8,808	10,084	16,314	15,866	17,383	18,232
75–84 years	2,628	4,850	7,755	9,002	14,670	13,216	13,996
85 and over	574	1,812	3,965	5,545	9,380	11,052	12,604

SOURCE: Social Security Administration, Office of the Actuary, *Actuarial Study No. 85*, July 1981. Cited in Rice and Feldman 1982.

Table 6 also shows the increase by sex. While the trend is downward for both men and women, the mortality rates are significantly higher for men and the downtrend is somewhat slower. Between 1960 and 2000, the death rate for women is projected to decline by 45 percent; the rate for men by 34 percent. A smaller differential is projected to occur after the year 2000 (Rice and Feldman 1982).

Proportion of Older Persons

The proportion of the population aged 65 and older has also been increasing rapidly. From 1930-1980, the proportion of the population aged 65 and over more than doubled, from 5.4 percent in 1930 to 11.1 percent in 1980. This trend is expected to continue during the next 50 years as the proportion over 65 is projected to be about 19 percent in the year 2030. The proportion of the population over 65 is expected to continue at about 20.5 percent for the 50 years following 2030.

The old elderly population has increased not only numerically since 1980 but also proportionally. The proportion of the population over 75 is expected to grow from 4.4 percent in 1980 to 11.5 percent in 2040 and to remain at about that level until 2080.

Dependency Ratios

The dependency ratio, that is the population over 65 relative to the 20-64 age group, is also projected to increase. The increase between 1970 and 2000 is expected to be relatively modest from 0.175 to 0.225 followed by a dramatic increase between 2000 and 2040 when the ratio is projected to increase from 0.225 to 0.379, after which time it will level off. While this sharply increasing ratio between the so-called dependent and supporting populations may have major implications for the financing of public programs, it should be interpreted with caution. Not only are the population projects subject to a

variety of uncertainties but also there is a growing debate regarding the medical and social desirability of age 65 being the beginning of a dependency period.

4. IMPLICATIONS OF AN AGING POPULATION ON THE USE OF HEALTH SERVICES

The aging of the population will significantly affect the use of health services. As has been noted, the elderly tend to be sicker, are more likely to suffer from chronic conditions and already account for a disproportionate share of health expenditures. As a result, throughout the 1980s and beyond, health care expenditures can be expected to increase both in absolute terms and relative to other sectors of the economy. This is particularly true for services heavily used by the elderly such as nursing homes. The projected increase in the number of women relative to men, implying an increased number of women living alone, will result in even greater pressure on nursing homes than would be implied by the increase in numbers alone. Researchers at the Health Care Financing Administration (Department of Health and Human Services) predict that nursing home expenditures will more than double between 1978 and 1985 and increase more than 400 percent by 1990.

Projections that go further into the future must be regarded with considerable conjecture as they depend on assumed future morbidity rates as well as institutional arrangements regarding the financing and delivery of care. Nonetheless, Dorothy Rice and Jacob Feldman of the US National Center for Health Statistics have projected utilization patterns on the basis of current age-sex rates of activity limitation and applied them to the population projections reported earlier.

Rice and Feldman (1982) predict a relatively small increase in physician visits since this type of care exhibits less age-specific variation than other measures of use. However, short-term hospital stays are predicted to almost double by 2040. Similarly the number of nursing home residents are projected

to increase by 2.5 times between 1980 and 2040 and expenditures for all medical services to increase by 158 percent in real terms (i.e., constant dollars). The result is that while the 11 percent of the population who were elderly in 1980 accounted for 29 percent of the expenditures, in 2040 the elderly will represent 21 percent of the population and account for almost half of the expenditures.

5. DEMOGRAPHIC CONTROVERSIES

The demographic projections that form the basis of utilization and expenditure projections were developed by the actuaries of the Social Security Administration using their intermediate assumptions. As with any long-term projections they include a variety of assumptions that can be subject to question and if altered can substantially change the outcome of the projection. These assumptions are briefly reviewed in the section below along with some of the current debate regarding morbidity and mortality rates.

According to Rice and Feldman (1982) the Social Security actuaries assume a fertility rate of 2.1 children per woman as of the year 2005. The current rate is 1.8. The mortality rates begin by incorporating the substantial declines that were observed in the past decade but these are gradually slowed so that they reach very conservative rates of decline after the year 2005. As noted earlier, the differential in the mortality rates between men and women will widen slightly.

Results of these projection assumptions transform population pyramids into rectangles. This is shown for the period 1960-2020 in Figure 1.

Assumptions regarding mortality trends have been the subject of controversy. The primary theories in contention involve the hypothesis of biological constraints on mortality changes (that is that senescence will soon limit life expectancy changes) versus the hypothesis of societal constraints on human mortality

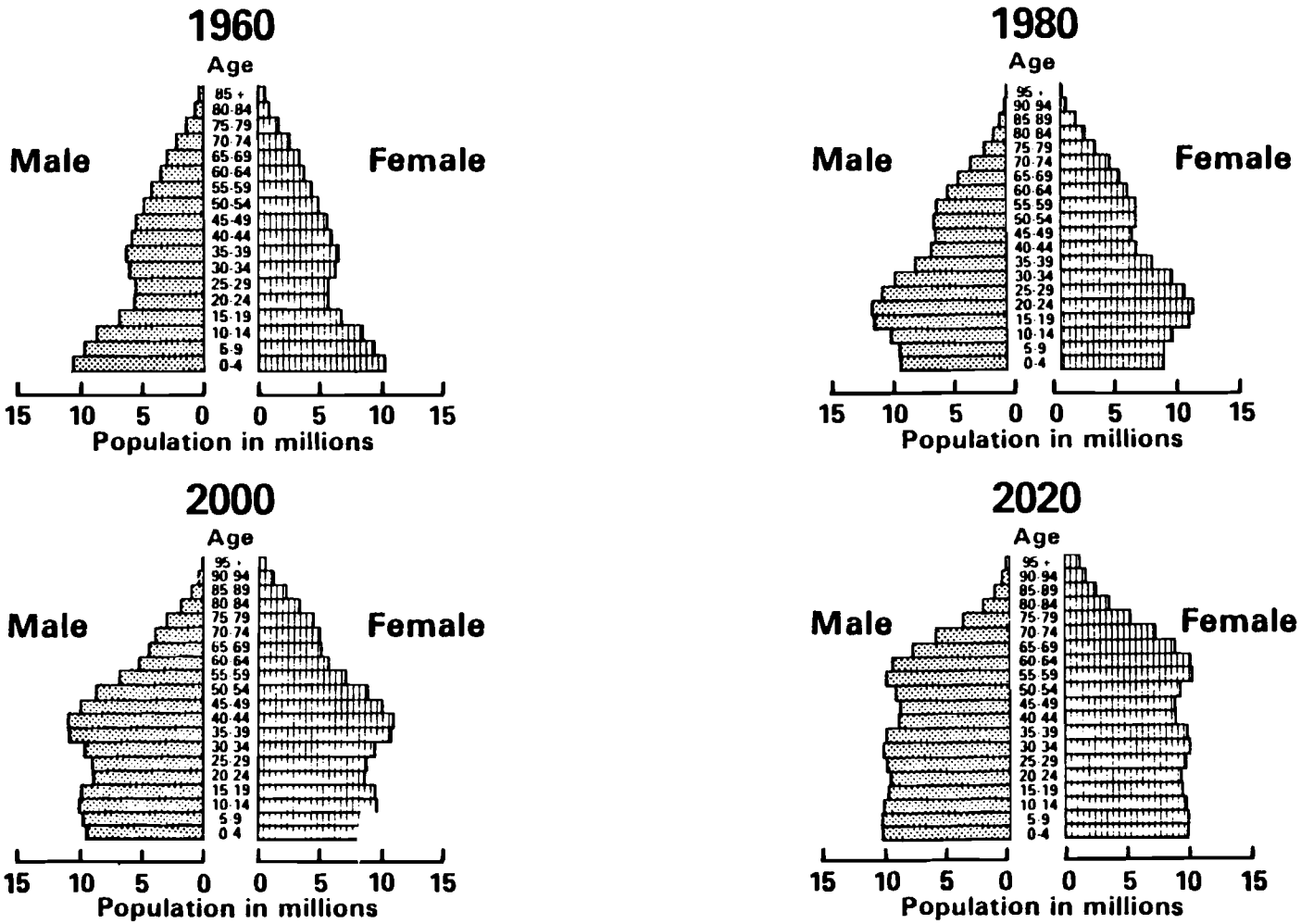

Figure 1. Age structure of the US population.

SOURCE: Social Security Administration. Cited in Rice and Feldman 1982.

changes (that is declines in mortality primarily reflect improvements in public health). In a recent article, Kenneth Manton (1982) a demographer from Duke University reviews the evidence regarding both theories and concludes that there is minimal support to substantiate hypotheses either of relevant biological or social constraints on life expectancy. The result could be an even greater growth in the size of the elderly population, particularly after 2005, which would in turn increase the demand for health services even further.

Even more at issue are the assumptions regarding future morbidity rates. In particular, it is unclear whether the declining mortality rates will be associated with an increase in the duration of a chronic illness and if so the severity of that illness or whether there will be a shorter period of morbidity prior to death. Manton suggests that although the prevalence of chronic illness may increase, the severity and rate of progression of the primary disease may be reduced. Rice and Feldman conclude that there could be both a compression of morbidity prior to death for some individuals as well as an appreciable lengthening of the illness period for other segments of the population but that it is not possible currently to predict the relative magnitude of these two populations. The implications for health care costs of these various alternatives may be substantial. Attempts to reduce the severity of chronic illness and slow its rate of progression will increase costs, and these costs are likely to accelerate as life expectancy and thus prevalence increases. However, as Manton points out, to the extent that the increased life expectancies are associated with an increase in the productive life span, the increased health costs may be offset by greater economic productivity.

Finally, the accuracy of the "dependency ratios" indicating the relative magnitudes of the dependent populations have been questioned. As just discussed, some of the increase in the elderly population could be associated with an increase in economic productivity. Furthermore, ability to predict changing

fertility rates has not been impressive and even modest changes in this rate can have substantial implications on the size of the supportive population and the predicted rectangularization of the population pyramid.

Despite these uncertainties, it is clear that the number of elderly will grow rapidly and that even without further mortality declines, the number of individuals over age 75 will almost double in the next 25 years. These demographic changes will have an impact on both the use of health services and type of health services demanded.

6. FINANCING FOR THE AGED

The major government program for the aged in the United States is Medicare. It is a federal government program that consists of two parts: a compulsory hospital insurance scheme (Part A) and a voluntary supplementary insurance scheme (Part B), which pays for physician services and some services and supplies not covered under Part A. Part A has a current deductible of $260 for the first 60 days of a hospital stay and $64 for the next 30 days. Part B has a monthly premium of $11 and a current deductible of $75; it pays 80 percent of covered charges in excess of the deductible.

Medicare, along with Medicaid (the government program for the poor) is estimated to pay about 54 percent of the health care expenditures for the elderly. About two-thirds of the elderly also have private insurance, although this only pays for a small share of their health bill (about 7 percent). The remainder is paid by the elderly themselves. Although Medicare was never intended to cover all medical care, an increasing level of concern has been expressed about the program's limited scope (Iglehart 1982).

The current system in the US of financing the elderly's health care is under great stress, which will only be exacerbated by the aging of the population. One area of stress

involves the financing of nursing home services. This is not a Medicare problem because Medicare essentially is geared toward acute care, covering only 2 percent of nursing home expenditures in 1979. It is, however, likely to be a Medicaid problem, which is a joint federal-state program, and it is of particular concern to the states. Medicaid is currently the largest single payer of nursing homes (49 percent) with most of the rest being paid by the elderly themselves. Attempts are being made to control the growth in nursing home expenditures by influencing both the reimbursement rates paid to the nursing homes and the use of these homes, for example, utilization review, prescreening programs, and restricting bed growth and reimbursement. In addition some attempts are being made to bring private insurance in as a payer and to use new settings for long-term care. Despite these various activities it is clear that the increase in the number of the old elderly in the next 25 years will place immense pressure on nursing homes.

An even greater and more immediate source of stress involves the funding of the Medicare system itself. Although the current financial insolvency of the Social Security system is receiving more prominent notice in the press, the financial instability of the Medicare system is only slightly less serious in the short run. In fact, it is being made more serious by short-term borrowing from the hospital insurance fund to finance the old-age insurance fund. The basic problem for Medicare is that hospital expenditures have been growing at a much faster rate than the wages used to finance this fund. There are three basic approaches that have been suggested to reduce the gap: restricting eligibility, increasing funding sources, or reducing the growth in expenditures—either by regulation or by trying to foster more competition. In fact a successful solution will probably require a combination of strategies. The particular combination that finally emerges will depend primarily on the political process.

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