POLICY OPTIONS AND THE IMPACT OF NATIONAL HEALTH INSURANCE

PREPARED UNDER GRANTS FROM THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE AND THE OFFICE OF ECONOMIC OPPORTUNITY

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R-1528-HEW/OEO
JUNE 1974

Rand
SANTA MONICA, CA. 90406

The research reported herein was performed in part pursuant to Grant 90088D-73-01 from the Office of Economic Opportunity, Washington, D.C., to Grant 1 R01 HS00840-01 and Grant 1 R01 HS01029-01 from the National Center for Health Services Research and Development, Department of Health, Education, and Welfare, and to a General Research Support Grant 5-S01 RR05710-03 from the National Institutes of Health, Department of Health, Education, and Welfare. Reports of The Rand Corporation do not necessarily reflect the opinions or policies of the sponsors of Rand Research.

Published by The Rand Corporation

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PREFACE

This report attempts to synthesize what is known about the effects of changed health insurance coverage. With the prospect of new legislation imminent, but considerable uncertainty about the effects of various options, this is an appropriate time to take stock of current knowledge in this area.

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This report has been published in its entirety, except for the Summary, the footnotes on pages 10 and 16, and minor editing, in the *New England Journal of Medicine*, June 13, 1974.

SUMMARY

The nation is now debating what type of publicly provided health insurance would be desirable. Many questions are at issue, including the extent of benefits, the locus of the administration of the plan (i.e., private or public sector), and the method of financing. In this report we concentrate on the issue of the extent of benefits. We use current knowledge of health economics to examine the potential effects of alternative benefit levels on demand for health services and the likely response of the delivery system. We make some brief comments on the likely effect of these choices on health status and then show how insurance programs might be structured to achieve various goals. Our goal is to provide an analytic framework that may be useful in the formulation of health policy.

THE EFFECT OF ALTERNATIVE COINSURANCE RATES ON DEMAND FOR SERVICES

We have chosen two prototypical plans for analysis; one would provide full coverage (no coinsurance), the other would mandate a maximum 25 percent coinsurance rate. With either, there will probably be only a fairly small increase in demand for *hospital services* because present insurance coverage for such services is now so nearly complete (approximately 90 percent of total hospital expenditures). We estimate an increase in demand of 5 to 15 percent with a full-coverage plan and of approximately 5 percent with the 25 percent coinsurance plan. Given that the nation's hospital system has significant excess capacity at present, we would not expect these increases in demand to create any important stress on supply.

With either prototypical plan, there will probably be a large increase in the demand for *ambulatory services*, in part because present coverage is fairly small (40 percent of total expenditures) and in part because of the sensitivity of demand for these services to price. A conservative approximation is that a full-coverage plan will induce a 75 percent increase in demand and a 25 percent coinsurance provision will induce a 30 percent increase. Given that at present the ambulatory

system has little excess capacity, we expect that with either program the pressure on the ambulatory sector will be substantial.

We estimate that the dollar cost for hospital and ambulatory services combined would be from $8 to $16 billion for a full-coverage plan and from $3 to $7 billion for a 25 percent maximum coinsurance plan. If the program included coverage for other services, such as dental care and drugs, we estimate that the increase in total cost would be $20 to $30 billion with the full-coverage plan and $10 to $20 billion with the coinsurance plan. These estimates assume that the additional demand could be satisfied and prices would not rise. In actuality, utilization of ambulatory services will be less than demand and prices probably will rise, with offsetting effects on the increase in total expenditure. Thus, our estimates are a reasonable approximation.

THE EFFECTS OF DEDUCTIBLES ON DEMAND FOR SERVICES

Small deductibles (for example, $100 or $150 per person per year) will have little effect on demand for hospital services, but they could exert an important effect on reducing demand for ambulatory services. Available data do not permit a quantitative estimate of the effect of small deductibles on the demand for ambulatory services.

A large deductible (for example, one that is equivalent to 10 percent of annual income), combined with complete (or nearly complete) coverage after the deductible, would only slightly increase the demand for either hospital or ambulatory services, providing individuals maintained their existing ("early dollar") health insurance coverage at roughly present levels. However, in the long run, the costs of such a plan, or any other plan that provides "last dollar" coverage, will be importantly influenced by the development of new technology, such as the artificial heart and other highly expensive forms of therapy.

The response to the introduction of large deductibles could be very different if at the same time the present favorable tax treatment of health insurance premiums were changed. Such a change should make the maintenance of present early-dollar private coverage unattractive for the consumer; if early-dollar coverage were not maintained, the result would be a significant reduction in demand for both hospital and ambulatory services.

TIME PRICE AND ITS INFLUENCE ON DEMAND FOR SERVICES

If dollar costs are lowered by a national health insurance program, the time costs of obtaining services would loom more prominently in the price of obtaining care. Under such circumstances, it seems likely that the demand for services from the "time poor" (executives, professionals, etc.) will increase less than the demand from the "time rich" (the unemployed, retired, etc.). If the total quantity of ambulatory services is fixed (in the short run), services will be redistributed from the "time poor" to the "time rich."

THE EQUILIBRATION OF THE SYSTEM IN THE FACE OF INCREASED DEMAND FOR SERVICES

If a national health insurance program places demands on the health care system that cannot readily be met by the currently available supply of services, the most desirable response would be an increase in productivity of the delivery system. There is little evidence to suggest that in the ambulatory sector, where most of the pressure can be expected, any of the envisioned reorganizations (most particularly, prepaid group practice) will increase productivity to a notable degree in the short run. Because productivity increases of sufficient magnitude to meet increased demand are unlikely to occur, equilibration mechanisms that limit utilization will inevitably come into play. These include increased prices, increased waiting time for appointments, increased waiting times at the place of care, a change in the mix of patients seen by the physician, and a change in the character of the services that are provided. The degree to which any one or combination of these mechanisms will come into play is unknown, but the mix of these adaptive mechanisms will affect who receives what kind of services for what kind of medical problem. It is clear, for example, that higher prices will most affect the dollar poor; longer queues will most affect the time poor. Higher prices will also enrich providers and may induce them to work less. Over a period of years productivity will increase (perhaps from substitution of ancillary personnel) and additional resources can be attracted into medical care; this will serve to expand supply, and will allow utilization to rise toward the increase in demand.

THE EFFECT OF HEALTH SERVICES ON HEALTH STATUS

The difference in health services consumed under various insurance plans is unlikely to affect mortality more than slightly. Rather, the major benefits of such services are more likely to be qualitative and involve primarily the relief of anxiety and pain and the provision of prognostic information.

THE FORMULATION OF HEALTH POLICY

The preferred form of health insurance depends upon one's goals. A considerable segment of society believes that health care should be free, that "health care is a right." If this is the goal, obviously a full-coverage plan is preferable. However, one may also have as a goal that equilibration mechanisms should not be activated. In this case, one might begin with full coverage of inpatient services, but institute a moderate deductible for ambulatory services. Such a deductible could then be reduced over time as supply expands.

Another segment of society believes that health insurance should protect the individual against severe financial hardship, but should not further increase the 8 percent share of society's resources devoted to medical care. These goals could be achieved by a plan with a deductible which was set at a certain proportion of a family's income (say 10 percent). If this plan were thought to unduly hamper the access of the poor to the medical care system, the deductible could be set at a smaller fraction of income in low income groups.

Ultimately, the choice between these two sets of goals involves the philosophical question of the degree to which society should allow the individual discretion. Those who hold the views that "health care is a right" believe that there are certain goods (such as health, education, and housing) which a progressive society should make freely available to its members; individuals in the society should be taxed (according to ability to pay) to ensure that a certain proportion of society's resources are used to provide these goods. Those who hold the view that insurance should protect against severe financial hardship believe that the individual should be allowed discretion to spend his income as he sees fit; if in the aggregate individuals do not choose

to purchase health services, then there would be fewer resources in health care and more devoted to other purposes.

The implications of these two alternatives are considerable, because society is potentially deciding whether 5, 8, or 11 percent of its resources are spent on health care.

ACKNOWLEDGMENT

The authors are deeply indebted to Marshall A. Rockwell, Jr., M. D., for helpful criticisms and comments and for his continued support and encouragement.

CONTENTS

I. THE INFLUENCE OF NATIONAL HEALTH INSURANCE ON THE DEMAND FOR MEDICAL SERVICES

With the prospect of early enactment of a new federal health insurance program, it is appropriate to review our knowledge of the economics of health insurance and to analyze some of the important options that are particularly relevant to policy formation. In our analysis, we will deal with three interrelated key issues. First, how much change in demand for health services will be created by any given insurance program and how much will such a change alter the nation's health care bill? Second, how readily can each component of the health delivery system respond to the expected increase in demand, and what will be the consequences if the demand for services cannot immediately be satisfied? In other words, how will the system equilibrate if it is placed under stress? Third, how much return on investment can be expected from increased provision of services? That is, how much improvement in the nation's health status can be anticipated in response to a new health insurance program?

It is not our purpose to consider what legislation should be enacted, but rather to anticipate, as well as possible, the effects of the major policy options that have been proposed for health care financing.

Because change in price is a central feature of a health insurance program, and because demand for health services is importantly influenced by price [1], we first focus on the relation between demand and price. We recognize that for any given person price is not the sole or overriding determinant of how much medical care he will purchase. Obviously, when an individual makes a decision to seek medical attention, such factors as how ill he feels, what advice he has received from friends, and his previous experiences with health care will play important roles. But health insurance would not alter these factors; hence, we analyze only the effects produced on demand by improved coverage *per se*. In addition, our estimates do not depend on whether it is the patient or the physician who makes the ultimate decision concerning the

use of particular services; our deductions simply reflect the effects of alternative insurance plans on use of services without reference to who is specifically responsible for the observed change.

The term "price" refers not only to dollars but also to time. Most of the debate over health insurance has dealt with the more visible dollar component of price because insurance affects that directly. However, time price--the value of time spent by a patient in acquiring medical services--is an important and frequently neglected component of the total price. Because changes in dollar price produced by insurance coverage may have an important indirect effect on time price, both aspects--dollars and time--must be considered in analyzing the potential effect of health insurance on total price and on demand for care.

DOLLAR PRICE AND ITS INFLUENCE ON DEMAND FOR SERVICES[1]

Our estimates on how changes in dollar price influence the demand for services are derived largely from natural experiments in which the insurance coverage of a small percentage of the population was changed [2-10]. Because the change in demand in these particular experimental circumstances did not stress the supply system, increased utilization can reliably be taken to represent the demand that was generated. In contrast, change in utilization cannot be taken as equivalent to a change in demand when the shift in coverage affects an entire community, or even a large proportion of the community, and we have not employed such data in our analysis.

The existing level of coverage is a critical determinant of how much increase in demand will occur under a national health insurance program. To the extent that a service is already well covered, improved coverage will obviously have little effect, and vice versa. Because inpatient and ambulatory services are currently insured to very different degrees, important differential effects on the demand for each of these services can be expected under a new insurance program.

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[1] Throughout our discussion we will present estimates derived from detailed calculations described in the Appendices. At appropriate points we will refer the interested reader to the relevant appendix.

Coinsurance and Full Coverage[1]

We shall first analyze the increase in demand that can be expected under two prototypical insurance plans. These plans epitomize some of the central issues embodied in major legislative proposals before the Congress, but neither is identical with any particular bill. The first plan calls for full coverage of all services; the second requires that all persons be provided with a policy that contains no greater than a 25 percent coinsurance provision. The net effect of the latter program would be that those whose current insurance program is better than that mandated (i.e., anyone whose plan has a coinsurance provision of less than 25 percent or who has full coverage) would not be affected by the legislation, but those with poorer or no coverage would be brought up to the minimum standard.

Inpatient services:[2] Because most inpatient services are already covered by private health insurance or governmental programs, the increase in demand for these services produced by any form of national health insurance will be fairly small. However, because inpatient services constitute more than half of the $62 billion expenditure on health services (Appendix A and Fig. 1), even a small relative change in demand will cause a large absolute shift in total resources devoted to health care. A quantitative estimate of the change in demand for hospital services is therefore important to policy formulation. From available data (Appendix B), we estimate that about 90 percent of inpatient bills

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[1] A health insurance plan typically provides either *full coverage* or contains a *coinsurance* or a *deductible* provision designed to alter the out-of-pocket cost to the consumer. Coinsurance requires that an individual pay out-of-pocket some fixed percentage of each dollar spent for health services. A deductible provision requires that the individual pay all of the initial costs up to a specified amount before the insurance becomes effective.

[2] Given the paucity of information on insurance coverage of inpatient physician services and how demand for them responds to changes in insurance, we have treated such services as though they were covered as well as, and respond to changes in insurance as do, hospital (i.e., non-physician) services. Our estimates are not notably sensitive to this assumption, because inpatient physician services constitute only about 15 percent of total expenditures on inpatient services (see Fig. 1).

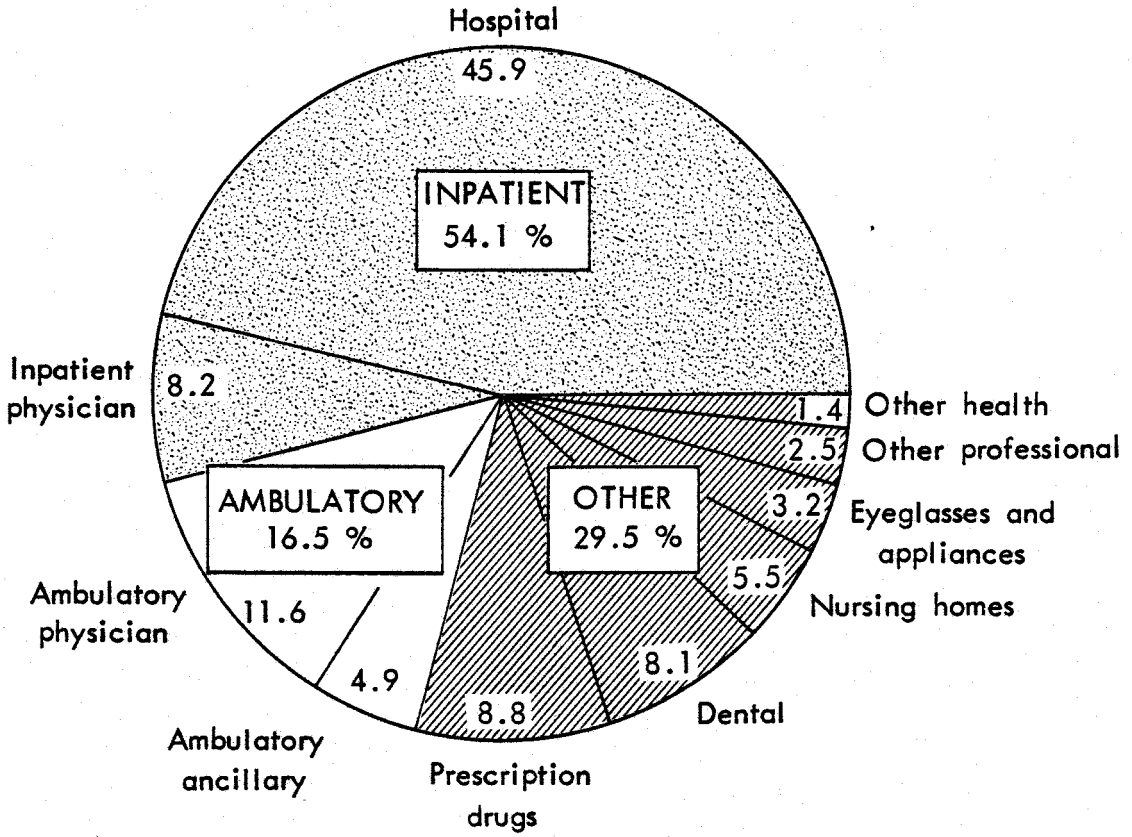

Fig. 1 — Expenditures on health services and on supplies likely to be affected by national health insurance

Note:

Each component is expressed as percentage of total expenditures. The data are from fiscal year 1972 and represent a total expenditure of $62 billion. Government expenditures on programs other than Medicare, Medicaid, and General Hospital and Medical Care are excluded from this total, as are all expenditures on non-prescription drugs. For a detailed discussion see Appendix A.

are currently paid by third parties and that a full-coverage plan would therefore expand protection by about 10 percent; we estimate that this improvement in coverage would lead to an increase in demand for inpatient services of approximately 5 to 15 percent (Appendix C). The effect of a 25 percent maximum coinsurance plan would be less. At one theoretical extreme, if everyone had better coverage than 25 percent coinsurance, there would be no change in demand. At the other extreme, if 90 percent of the population were fully insured and the remainder uninsured, the expected increase in demand would be approximately 8 percent (Appendix C). The expected change in demand for inpatient services from the 25 percent coinsurance plan is therefore between zero and 8 percent.

The change in demand for inpatient services theoretically might be affected not only by a program's coverage of such services but also by its coverage of ambulatory care. For example, many argue that if outpatient coverage were widely available, demand for hospital services would fall [11-14]. This hypothesis has intuitive appeal, but the data do not support it; in most cases where outpatient coverage alone has been increased, there has been, if anything, a slight *increase* in the demand for inpatient services [5,6,9]. One possible explanation for this finding is that the additional use of ambulatory services leads to the discovery of disease requiring hospitalization and that this offsets the shift of some care away from the hospital.

Ambulatory services: In contrast to hospital care, expanded coverage of ambulatory services (physician plus ancillary services) will almost certainly cause a large percentage increase in demand. For ambulatory physician services, we estimate that a full-coverage plan would increase demand by 75 percent (Table 1a) and that a 25 percent maximum coinsurance plan would increase demand by 30 percent (Table 1b). We would emphasize that these represent conservative estimates of the changes that can be expected under each program.

Ambulatory ancillary services have not been studied as extensively as have physician services, but the limited available data indicate that they are about half as responsive as are physician services to changes in coverage [8]. Hence, by halving the increases shown in Table 1, we

Table 1a

CONSERVATIVE ESTIMATE OF THE EFFECT OF A FULL-COVERAGE PLAN ON DEMAND FOR AMBULATORY PHYSICIAN SERVICES[a]

Previous Coverage	Percent of Population	Percent Increase in Demand Induced by Change in Coverage
None	50	120
20% coinsurance	50	30
Average over population		75[b]

Table 1b

CONSERVATIVE ESTIMATE OF THE EFFECT OF A 25-PERCENT MAXIMUM COINSURANCE PLAN ON DEMAND FOR AMBULATORY PHYSICIAN SERVICES[a]

Previous Coverage	Percent of Population	Coverage After Plan	Percent Increase in Demand Induced by Change in Coverage
None	50	25% coinsurance	60
20% coinsurance	50	Unchanged	0
Average over population			30[c]

[a]For derivation of values employed in this table, see Appendices D and E.

[b](75 = .5(120) + .5(30)).

[c](30 = .5(60) + .5(0)).

conclude that a full-coverage plan would increase demand for ancillary services by 35 to 40 percent, and a 25 percent coinsurance plan would increase demand by approximately 15 percent.

The Dollar Costs of Prototypical Programs

Assuming that the additional demand created by the prototypical plans could be fully satisfied and that medical care prices would not rise, what do our estimates imply in terms of dollar expenditures? Figure 2 shows the increases in cost that could be expected in the *short run* under each program. No correction for general inflation has been included. These values have been derived by multiplying the percentage increase in demand for both hospital and ambulatory services by the current expenditures on each service. As shown in the figure, a full-coverage plan would increase costs by $8 to $16 billion per year, whereas a 25 percent maximum coinsurance plan would increase it by $3 to $7 billion per year.

Estimates of long-term changes in cost involve many unpredictable factors and are therefore so uncertain that accurate projections of expenditures do not appear feasible. For example, if a full-coverage, or nearly full-coverage, plan were implemented, the government would become the principal buyer of health services; consequently, prices would become subject to negotiations on rates of reimbursement, with uncertain effects on final costs. Changes in technology could also have important effects because they might markedly reduce the amount of resources required to meet a given level of demand (see below). The net effect of such offsetting influences is impossible to predict.

If, in addition to hospital and ambulatory care, "all other services" (e.g., dental and prescription drugs) were covered by a new program, the cost of each prototypical plan would be considerably higher. As shown in Fig. 1, "all other services" account for 30 percent of current health expenditures, or $18.6 billion (fiscal year 1972). Coverage of these services under present insurance programs is practically non-existent, and it can reasonably be assumed that if new protection is provided demand will be markedly stimulated. Limited evidence indicates that full coverage of prescription drugs and of

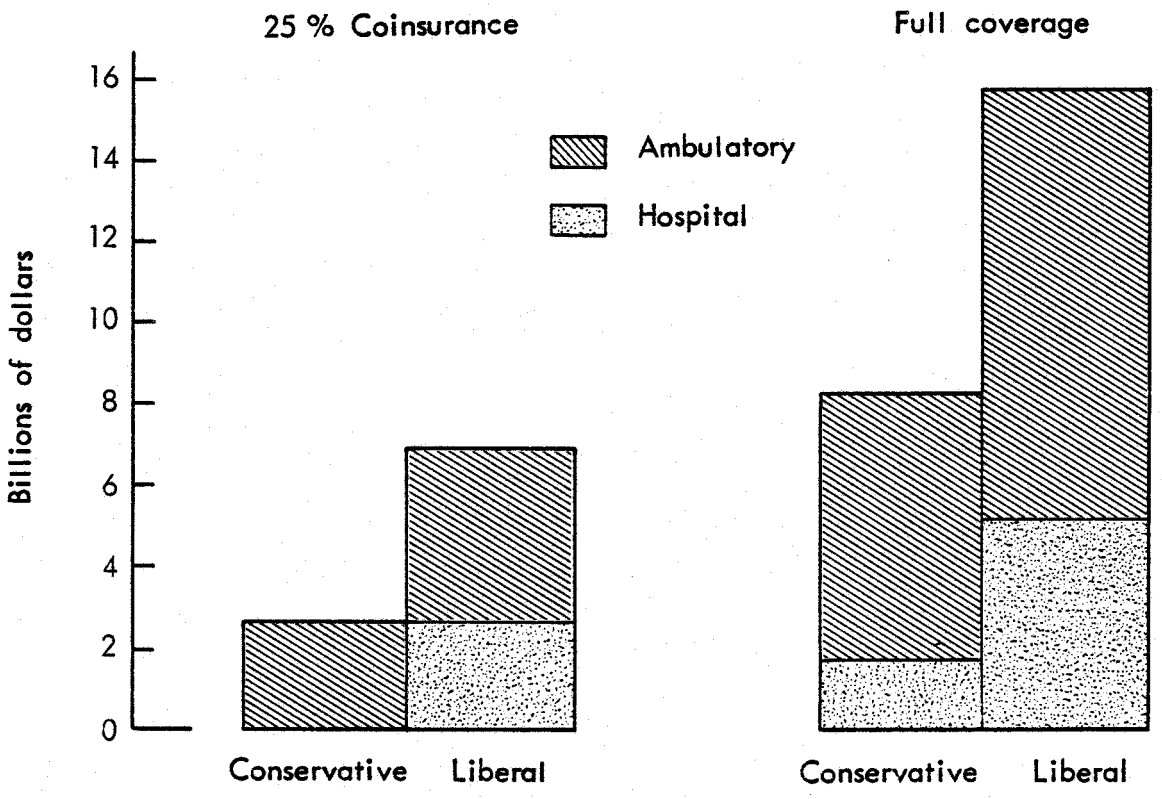

Fig. 2 — Conservative and liberal estimates of the increase in expenditures for inpatient and ambulatory services that can be expected under a full-coverage plan and under a plan that mandates no greater than a 25 percent coinsurance payment

Note:

These figures represent expenditures in excess of the $43.5 billion expended in fiscal year 1972. The values shown were calculated on the theoretical assumption that all demand created by a given plan could be satisfied and that medical care prices would remain at present levels. The figure of $43.5 billion excludes expenditures that are not likely to be influenced by national health insurance, such as those of the military, the Veterans Administration, and others (Appendix A), as well as expenditures on prescription drugs, dental services, and the like. The derivation of the values is explained in Appendix F.

dental services might increase demand by about 100 percent. It has been observed, for example, that drug usage in a group with nearly complete coverage was approximately double that of a control group with no insurance [1,3]. Similarly, the demand for dental services among a group of Teamsters will complete coverage was nearly twice as large after full-coverage was provided than before [7, also 1]. However, the actual increase in demand under a full-coverage insurance program probably would be somewhat smaller than predicted by these data, because in some of the studies heavy users of health services may have opted for more coverage (so-called "adverse selection"). Nevertheless, an increase of only half of what the data suggest would represent nearly a $10 billion rise in expenditure at current prices.

Other estimates of the change in demand that might follow introduction of a national health insurance program are in our view open to criticism. Analysts in the Social Security Administration provide no empirical evidence to support their conclusions [15]. Others [16] have based their estimates on a technique that greatly overstates the effects of insurance coverage on demand [17].

Deductibles

Small deductibles: Inclusion of a relatively small deductible ($50 or $100 per year) would cause an increase in demand for *hospital services* little different from what would be induced by a full coverage national plan. Assuming that an average hospitalization costs about $1,000, a deductible of $100 might have roughly the effect of a 10 percent coinsurance rate, which would, we have estimated, produce about a 10 percent reduction in demand. However, the patient contemplating hospitalization, or his physician, is likely to take much less account of a deductible than he would of a coinsurance provision because 1) he may already have partly or totally satisfied his deductible by previous payments for ambulatory or hospital services; 2) he does not risk incurring a very large bill (e.g., with a prolonged hospital stay) as he might with a coinsurance provision; and 3) he knows that after the deductible is satisfied during the inital episode of hospitalization, all care for the remainder of the policy period will be free.

In the case of ambulatory services, a quite small deductible (such as less than $50 per person per year) is not likely to have an effect on demand different from a full-coverage program; however, a somewhat larger (but still fairly small) deductible is likely to influence demand markedly. Consider a representative (median) individual who at present has scanty insurance for ambulatory care and makes about two office visits a year [18, Table 20; 19] at a total expenditure of perhaps $30 to $40. Because even without insurance he is spending almost $40, it is likely that when faced with a deductible of less than $50, he would act as if he were in fact fully insured. However, when faced with a deductible of $150 or more, representing an amount considerably above his typical expenditure, his demand for services would probably be considerably less than under a full-coverage or 25% coinsurance rate plan. Unfortunately, no information is available to determine exactly what size deductible (for example, $75 to $100) begins to exert an important effect on the demand for ambulatory care.[1]

Large deductibles and catastrophic coverage: Several recent proposals for national health insurance have incorporated as a central feature the full, or nearly full, coverage of all hospital and ambulatory care after a large deductible has been satisfied. The goal of each program has been to provide financial protection against catastrophic illness. For example, one proposal contains a 60-day hospital deductible plus a $2,000 deductible for other expenses [20]. Another widely discussed plan relates the size of the deductible to income, thus defining catastrophe in terms of each family's financial circumstances. Such a deductible, it has been proposed, might appropriately be set at a level equal to 10 percent of family income [21,22].

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[1] It is, of course, possible to combine a deductible and a coinsurance provision. The effect of such a combination on demand can be inferred from the above discussion. For example, a plan with a $150 deductible and a 25 percent coinsurance rate after the deductible would have an effect on ambulatory services little different from a plan with only a $150 deductible because this deductible is already well above typical expenditure. In the case of hospital services, demand would be somewhat less than in a 25 percent coinsurance plan; the patient with a $1000 hospitalization, for example, would pay around 35 percent of the bill rather than 25 percent of the bill.

What would be the effect on demand if a large-deductible plan were enacted? Although such a plan would remove the usual upper limit on coverage (i.e., it would provide last-dollar protection), it would in all likelihood add little to total demand. The increment in demand for hospital services would of necessity be less than the 5 to 15 percent increment that full coverage would cause, because a full-coverage plan includes not only last-dollar but also first-dollar protection. Furthermore, the increment in demand for ambulatory services would be negligible, as is apparent from our discussion of small deductibles. Thus, catastrophic coverage would increase total demand by at most a few percent.

The Influence on Demand of Improved Consumer Understanding of Insurance

Our conclusion that a catastrophic insurance plan is likely to cause a modest increase in demand has been based on the assumption that consumers would maintain their existing "early dollar" coverage--i.e., their coverage for initial or small expenditures. However, this assumption may well be wrong. If so, the consequence could be a reduction rather than a small increase in demand. The reasoning is as follows: Early-dollar coverage protects against the least damaging expenditures and is therefore the least valuable insurance. Nevertheless, many consumers, primarily from middle and upper income groups, have purchased such coverage. To suggest that they would drop this protection if a catastrophic insurance plan were enacted seems unreasonable because such behavior would imply that they now buy more insurance than they consider optimal. However, it is conceivable that many consumers do not fully understand their present policies, most of which are complex, and that their purchase of early-dollar coverage simply reflects a failure to appreciate how expensive this protection is. For example, given a new federal catastrophic plan covering all expenditures above $1,000 of expense, a family may for the first time become aware that it is paying a private insurance company some $500 to insure itself against the first $1,000 of medical expenses. It is reasonable to suspect that under such circumstances a reduction in early-dollar coverage will occur; this, in turn, would serve to reduce

demand, offsetting to a significant extent the increase that would otherwise be generated by new last-dollar coverage.

Effect of a Change in the Tax Treatment of Health Insurance Premiums

If the current highly favorable tax treatment of health insurance premiums were altered, there would very likely be a significant effect on the amount of early-dollar coverage purchased by consumers. At present, employer-paid premiums are not treated as taxable income and half of individually paid premiums (up to $150) can be taken as a personal tax decution. Many believe that this kind of inducement to purchase private insurance will no longer be appropriate if there is a national plan that protects against financial catastrophe [23,24]. If, in response to this view, the tax subsidy were reduced or eliminated, the amount of early-dollar coverage purchased by consumers would probably decrease markedly [25]. How large a reduction might occur cannot be estimated reliably. However (at the extreme), if all individuals dropped their existing private plans and if the public plan included a deductible equal to 10 percent of income, about 80 percent of families would face a deductible of $600 per year or more [26]. Thus, it appears that a change in the tax law and introduction of a large fixed or income-related deductible could well leave total demand for services unchanged or even reduce it below current levels.

Effect of New Therapeutic Modalities

New modes of therapy, as yet not developed, could have important effects on our estimates of demand. For example, if the developmental work on an artificial heart were to reach a stage where implantation of such a device became a practical therapeutic procedure, a large new demand for services would be generated among those with last-dollar coverage. The cost of a program of heart implantation has been estimated to be in the range of $1.0 to 1.5 billion a year [27]; and the development of new technology in other fields of medicine could readily add several billion dollars per year to the cost of last dollar coverage.

There is, of course, the alternative possibility that certain

technological advances might reduce rather than increase expenditures. Just as poliomyelitis vaccine made obsolescent the highly expensive "iron lung" technology, so would an effective medical means of preventing or treating coronary artery disease make cardiac replacement largely obsolescent. It is thus clear that decisions on investment in biomedical research, and the specific research goals to be pursued, will have important implications for seemingly independent decisions concerning investment in a national health insurance program. Such cross-linkages deserve more attention than has been given them in the past.

TIME PRICE AND ITS INFLUENCE ON DEMAND FOR SERVICES

The time an individual spends in acquiring medical services, as well as the dollars paid for such services, is an important component of the total price of his health care. In many instances time price is reflected explicitly in loss of income; indeed, the importance of this cost of obtaining care is underscored by the extensive development of sick leave provisions. In other instances, the price is paid in terms of lost opportunities--the opportunity to pursue activities such as making repairs around the house or enjoying a hobby. Although these avocations are not income producing, they obviously have considerable value.

How much of an effect does time price have on demand? Data from widely diverse populations indicate that it plays an important role, particularly in determining the demand for ambulatory services. For example, a 10 percent increase in the travel time to outpatient clinics among a low-income urban group caused an estimated 10 percent decrease in demand for physician visits [28, Table 3, Equation 1]. The same behavior has been observed among a group of largely middle-income group of consumers; those living more than 20 miles from a clinic had only two-thirds as many visits as those living within 5 miles [8]. Similarly, when a student health service was moved so that reaching it required a 20-minute walk rather than a 5- to 10- minute walk, visits fell by nearly 40 percent [29]; a similar effect of travel time has been noted in a number of analogous studies [30].

These findings appear to have important implications for the proposition that the locus of care for most of the population should be shifted to large centralized practices. If such a change in the delivery system were effected under a national health insurance program, travel time would, on balance, almost certainly rise appreciably and demand would tend to fall. The rise in time price and its influence on demand would thus in part offset the influence of the fall in dollar price produced by a national health insurance program.

Waiting time also significantly affects demand. For example, a 30 percent increase in waiting time caused an estimated 10 percent decrease in demand for ambulatory care [28, Table 3, Equation 1]. This observation is also important to the national health insurance debate because extensive coverage of ambulatory services is likely to cause an increase in the time the patient must wait in order to obtain care (see below).

Time price has still another important policy implication. Even if national health insurance causes no change in the time required to obtain care, variations in the value of time to individual population groups will influence how much each group will change its demand for services in response to reductions in the dollar price of care.[1] Any group that is dollar-poor but time-rich (e.g., the retired, the unemployed) will find that the reduction in dollar price produced by national health insurance has a large effect on *total* (time plus dollar) price, whereas those groups that are time-poor (e.g., the professional, the self-employed) will find that total price is little changed. Hence, any given reduction in dollar cost produced by national health insurance can be expected to increase demand more among those for whom time has a low value than among those with a high value of time.

This hypothesis gains appreciable support from a variety of studies. When a 25 percent coinsurance rate for ambulatory services

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[1] Time price can be made commensurate with dollar price by multiplying the amount of time (in hours or minutes) by a value per unit of time. For employed individuals the value of time is usually assumed to be the wage rate; for others, obtaining such a value requires rather sophisticated treatment [31,32].

was imposed on individuals who previously had full coverage, all groups in the population reduced their demands; however, the decline for female dependents was 67 percent greater than that for female or male employees [9], groups that presumably had a higher value of time [8]. These and other data [33] also show that changing a coinsurance feature causes a relatively greater change in demand among low-income groups than among high-income groups.

II. HOW MIGHT THE SYSTEM ADJUST TO A MARKED INCREASE IN DEMAND?

A change in demand will be translated into a change in utilization only if the delivery system is not stressed. If the system is stressed, mechanisms will be called into play that will control demand and allow the system to equilibrate. These mechanisms will continue to operate so long as the increase in supply of services does not match the increase in demand, and their effect will determine who receives what service for what medical problem.

SHORT TERM ADJUSTMENTS TO INCREASED DEMAND

The 5 to 10 percent increase in demand for *hospital services* that might be generated by a national health insurance plan will probably not place any unusual stress on the delivery system. Part of the increase in demand would be for additional patient days, but this load could readily be accommodated because current national occupancy rates average only 78 percent [34].[1] Thus, the major factor likely to produce pressure on hospitals will be the demand for higher quality and more sophisticated services. The most important consequence of this pressure is likely to be a rise in the price per patient day.

The prediction that there will be little stress on hospitals could be altered dramatically if, before the introduction of national health insurance, the supply of beds were deliberately decreased. Under these circumstances, a new insurance program would place considerable pressure on the system with the result that patients, particularly those with non-urgent problems, would have difficulty in obtaining admission [35]. In Great Britain such pressure on beds has led to a situation in which elective admissions must often be deferred for a year or longer [36-38].

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[1] An increased demand for hospital services will also generate an additional demand for inpatient physician services. However, because inpatient physician services are only about a third of total physician services (Appendix A), the strain on physicians from this increased demand for hospital services is not expected to be large.

What can be expected in the case of ambulatory services? Almost certainly either prototypical insurance plan would generate an increased demand that would far exceed the current capacity of the delivery system.[1] As a result, the rise in utilization would inevitably be limited by some or all of the following mechanisms: 1) an increase in dollar prices; 2) delays in receiving appointments; 3) an increase in waiting time at office or clinic; 4) a change in the character of the services provided; and 5) a change in the mix of medical problems seen by physicians.

(1) Inflation and price controls: A fundamental economic principle states that if demand rises and supply cannot be increased, prices rise. Thus, if there were a marked increase in the demand for ambulatory services, there would be a steep rise in the price of such services. Such an increase in price would in turn have a number of secondary effects. First, individuals providing ambulatory services would be enriched at the expense of everyone else. Second, an increase in price (except under a full coverage plan) would partly offset the increased demand that an insurance program is intended to generate. Finally, the price rise might lead physicians to work less because they could then earn their present income in fewer hours, an option many would be especially likely to choose because of the progressive income tax structure. If such a reduction in work week were to occur, a secondary effect could be expected: the reduced availability of physician time would lead to still higher prices, and this could induce physicians to work still less. The resulting exaggerated imbalance between supply and demand would further increase the burden that would have to be placed on other equilibration mechanisms.

Because the consequences of an increase in price are thought to be undesirable, it is likely that *price regulation* will be looked to as an ameliorating device. Unfortunately, experience with price regulation

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[1] The ability of suppliers to make rapid increases in the production of services other than those provided by hospitals and physicians varies markedly. Dental services, like those of the physician, are difficult to expand rapidly, whereas the production of drugs and eyeglasses is generally not. Because of the variety of supply conditions, we have not systematically discussed how these markets equilibrate. Our analytic approach can, however, readily be applied to such services.

in a variety of industries does not augur well for the effectiveness of this approach. It has been demonstrated repeatedly that, in the long run, regulatory commissions are either ineffective or take actions that cause prices to reach levels above what they would be in the absence of regulation [39-46]. Moreover, given that there are 200,000 physicians in private practice, there is a serious question as to whether a regulatory approach is feasible without diverting an inordinate quantity of resources to enforcement.

Even if there were nominal compliance, the purpose of the controls might well be defeated by a variety of stratagems. For example, physicians might begin to charge for such services as telephone consultations or the examination of X-rays that had been previously free [47]. Most important, even if the price of health services were to be controlled effectively, the problem of dealing with excessive demand would not be solved; the result would simply be a transfer of the burden of equilibration to other mechanisms.

(2) Delays in receiving appointments: If, as can probably be safely assumed, private physicians and clinics maintain their appointment systems, a likely effect of increased demand will be a considerable lengthening of the time that a patient must wait for an appointment. Experience in Canada lends strong credence to this projection: The introduction of full coverage in Montreal caused a near doubling of the number of days to the time of appointment [48]. The effect of such queueing would be to prevent the demand for ambulatory services from being fully expressed as utilization; however, this mode of equilibration exacts its own costs. First, even those with self-limiting diseases would suffer disagreeable consequences: The patient would be denied the opportunity for symptomatic relief and, in many instances, would experience anxiety about his prognosis, which the physician could readily have allayed. Second, those with more serious illnesses could suffer permanent harm from the delay in obtaining care. For example, patients with glaucoma may develop irreversible loss of vision and those with subacute bacterial endocarditis may have their lives placed at risk.

(3) Increased time prices: A considerable increase in the time

price of obtaining services is highly likely as the ambulatory system comes under pressure. First, the amount of time spent in a waiting room, clinic, or physician's office is likely to increase as the doctor, in attempting to "squeeze in" a few more patients, disrupts his appointment schedule [48]. Second, many patients will turn to the emergency room for care with the likely result that queues will develop and time price will rise. The net effect of such changes in waiting time will be to reduce demand for ambulatory services among the affluent, who are primarily time-poor, and thus to enhance the tendency of a national health insurance program to reallocate services toward the dollar-poor. Whether this effect of queueing should be viewed as socially desirable is open to debate; however, the use of queueing to accomplish even a desirable goal inevitably exacts important costs. Time spent waiting is time taken from other productive uses, usually without generating anything of value in return; a familiar recent example is the time wasted in purchasing gasoline.

(4) A change in the character of services provided: If demand rises but the total supply of ambulatory services is constant, one way that the system might equilibrate is through a more rapid turnover of patients. Physicians and nurses confronted with an increased work load might simply reduce the time spent with each patient by either reducing the revisit rate or allowing less time per visit. Length of time per visit could be shortened, for example, by abbreviating the process of history taking or of physical examination. This change in the character of the service could, of course, have the undesirable effects of allowing treatable disease to be overlooked. If this were indeed the consequence the change would probably be viewed by both health professionals and the public as a degradation in the quality of care. However, since this change in the character of services would allow more patients to have physician contacts, the ultimate effect of shortened visits and fewer revisits on the health status of the population is not entirely obvious.

(5) A change in the mix of patients seen by the physician: If there is a reduction in the dollar price of services, a large component of the increased demand will quite likely come from those with minor

complaints. Under these circumstances, the physician's decision on the allocation of his office time may serve to discourage utilization and thus help to equilibrate the system. If the doctor discourages (or refuses) visits from those who he feels do not have serious physical or emotional problems, he will, of course, reduce demand. Whether physicians will behave in this way in uncertain.

Short-Run Equilibration as Illuminated by the Medicare-Medicaid Experience

The events following introduction of Medicare and Medicaid emphasize the serious consequences of stress on the delivery system. We estimate that the Medicare and Medicaid legislation increased the demand for ambulatory services by only 10 to 15 percent (see Appendix D, part 3), much less than either prototypical plan. However, because of limitations on supply the rise in demand did not lead to an increase in physician visits [18, Table A] but simply activated equilibration mechanisms; there was a doubling of the rate of price increase for physician services [49] and probably an increase in time price as well. Indeed, the redistribution of ambulatory visits from the more affluent to the poor [18, Table A] supports the interpretation that a considerable rise in time price did occur. A similar redistribution of services from upper- to lower-income groups was observed when a full-coverage plan for ambulatory services was introduced in Montreal [48], in Great Britain [50], and in Saskatchewan [51].

Short-Run Expenditure Estimates in Light of Equilibration Mechanisms

Our expenditure estimates (Fig. 2) have been made on the assumption that all of the desired additional services under a national health insurance program would be forthcoming and would be delivered at current prices. These estimates could well be in error if supply could not rise to equal demand and if the increase in demand led to a rise in price. As pointed out earlier, we believe that supply side constraints are not likely to be a significant problem in the hospital sector. However, in the ambulatory sector such constraints are likely to be severe, with the result that utilization will almost certainly be lower

than projected and prices higher. Nevertheless, because these two factors tend to offset each other in their effects on expenditures, the values in Fig. 2 are probably reasonably accurate. Furthermore, since ambulatory services represent less than 20 percent of the total bill for health care (Fig. 1), even a considerable error in our estimates for the ambulatory sector would not greatly affect our projections of short-term changes in total expenditure.

LONG TERM ADJUSTMENTS TO INCREASED DEMAND

Hospital services: Because the expected increase in demand for hospital services is fairly modest, it can probably be absorbed by the existing hospital system. Marked long-term upward adjustments in supply of beds will therefore almost certainly not be necessary. Indeed, it is likely that the expected increase in demand will, in the long run, be almost wholly offset by organizational changes now underway. To the extent, for example, that Health Maintenance Organizations (HMOs) spread through the system and reduce the use of hospital beds, pressure on hospitals will diminsh. Professional Standards Review Organizations (PSROs) and pre-admission certification will probably accomplish a similar purpose. The problems of long-range adjustments of supply will thus be confined primarily to the area of ambulatory care.

Ambulatory services: The supply of ambulatory services could, over the long term, be expanded either by an increase in physician productivity (i.e., more services rendered per physician hour) or by the allocation of more resources to the ambulatory sector. An increase in productivity, some believe, might best be achieved by widespread introduction of HMOs. However, although HMOs may have the potential to enhance productivity, there is no evidence that this potential has been realized in the delivery of ambulatory care [52]. Other mechanisms designed to influence physician productivity, such as peer review, may ultimately prove to be effective in the ambulatory sector, but their value has not yet been demonstrated.

A far more promising approach to the problem of productivity is likely to be through the expanded use of allied health personnel. The

more widespread use of aides and physician's assistants in ambulatory care offers a potentially highly effective way of delivering each unit of service at a cost less than at present [53]. Unfortunately, however, most physicians appear reluctant to employ additional personnel [54]; for this reason, it is not clear how great an effect on productivity such personnel will have in the foreseeable future.

If productivity does not increase markedly, the allocation of more resources to the ambulatory sector will be necessary if the stress on the system is to be relieved. An additional commitment of resources will probably also be required to deal with the present uneven geographical distribution of health services. Investment in new transportation systems and in computer networks are examples of the strategies that will be required to assure delivery of care to those who currently have limited access to health services [55, 56].

III. THE BENEFITS FROM AN INCREASED INVESTMENT IN HEALTH SERVICES

Much of the debate on national health insurance has failed to address the central issue of what return on investment can be expected from the provision of more health services--i.e., how much improvement in the nation's health status is likely to result from an insurance program of a given degree of generosity. It is beyond the scope of this report to consider this difficult problem in any detail but some brief comments are in order.

During the past 15 to 20 years there has been little increase in life expectancy in the United States, and there is no reason to believe that increased resources spent on health care will alter this situation appreciably [57]. Social factors responsible for premature death--such as poverty, smoking, alcholism, and automobile accidents--are little affected by the availability of health services. Similarly, the major biological determinants of life expectancy--such as cardiovascular disease and cancer--are not dramatically influenced by current forms of therapy. Provision of additional health care is therefore not likely to influence mortality statistics more than slightly unless research advances lead to new therapies affecting several of the major causes of death [58].

It has also been hoped that improved insurance coverage of ambulatory care, by increasing the consumption of preventive services, would increase life expectancy. However, even if expanded coverage brings about greater utilization of ambulatory services (over the long term), it is doubtful that this will importantly affect length of life. Recent analyses of the results of both multiphasic screening and annual physical examinations have yielded little evidence that such techniques have any pronounced effect on expectancy [59-65].

The highest return on additional investment in health services will almost certainly result from an improvement in the quality of life, that is in the subjective components of health status. However, substantial difficulties must be faced when return on investment in medical

services must be assessed in subjective terms. Relief of severe pain and the alleviation of anxiety are striking examples of subjective benefits whose magnitude and value are difficult to quantify [66]. Realistically, then, policymakers must recognize that even a substantial investment in delivery of more health services is not likely to produce any clearly measurable change in any dimensions of health, whether length of life or physical well-being.

IV. GOALS AND STRATEGIES FOR FORMULATING NATIONAL HEALTH INSURANCE POLICY

In this section, we examine two sets of theoretical goals and show how a health insurance plan designed to satisfy each might best be structured. In the first example, we will assume that the intent is to achieve the following goals:

- To assure that price is not a barrier to obtaining services--that is, to make certain that out-of-pocket payments by the consumer do not play a role in determining his use of medical services.
- To assure that demand induced by a national health insurance program does not exceed the available supply of desired services--that is, to make certain that equilibration mechanisms are not activated.

In the case of hospital services, both goals could readily be accomplished. Full coverage of hospital services would assure that dollar price is not a barrier to obtaining services and, given the current surplus of hospital beds, the increase in demand produced by the program would not activate equilibration mechanisms. Ambulatory services present a very different picture. To make a commitment to full coverage (or even to a 25 percent coinsurance provision) and to concomitantly avoid undue pressure on the delivery system is impossible, as our analysis has made clear. This dilemma could be resolved by a decision to settle, at least initially, for a deductible provision that would cause only a small aggregate increase in demand but would protect each individual against the (fairly small) risk of incurring a large bill for ambulatory care. Based on our analysis, a deductible of $150 to $200 per person per year for ambulatory care would accomplish this goal; those individuals sufficiently ill to require extensive ambulatory services would face no appreciable financial barrier to care, and yet the small additional demand they would generate would

not be sufficient to call equilibration mechanisms into play. Over time, if supply expanded or if demand did not rise as much as expected, there could be a stepwise reduction in the deductible. The response of the system to each such reduction could be used as a guide to the magnitude of the next decrement. This sequence could move the program toward the eventual goal of removing all financial barriers to care.

Let us now take a second example that incorporates another set of possible goals. These are:

- To assure that major illness does not lead to financial catastrophe.
- To assure that the share of the nation's resources devoted to medical care is not increased above current levels.
- To assure the poor of increased access to ambulatory services.[1]

The first goal, that of protecting against a large financial loss, could readily be achieved by an insurance plan that would cover all services above a large deductible. Such a plan, combined with a change in the current favorable tax treatment of premiums, could also be used to achieve the second goal of assuring that the share of resources devoted to medical care not be increased. Exactly how large a deductible would be necessary to achieve the desired goal is not clear because we have no precise estimate of the influence on demand of a given deductible nor of the effect of a concomitant change in the tax law.[2] It might therefore be necessary to initiate the program with a deductible high enough to assure that expenditures are held somewhat below current levels; decrements could be made later to allow the commitment of national resources to rise to the desired point.

The change in tax treatment of premiums might also accomplish the third goal, that of assuring the poor of increased access to ambulatory

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[1]The goal of increased access has been made specific to ambulatory services because the poor already use hospital services at a higher rate than middle- and upper-income classes [67].

[2]A social experiment in health insurance designed to provide data on these issues is now in progress [68].

services, because such a change is likely to reduce early-dollar coverage and to lower demand among upper- and middle-income groups. The amount of redistribution that could be achieved in this fashion is small because the amount of early-dollar ambulatory coverage now in force is not large (Appendices D and E). However, one could argue that only a limited redistribution is, in fact, called for because the poor (although not their children) visit the physician with nearly the same frequency as do the rest of the population (Table 2). If, despite

Table 2

OUTPATIENT PHYSICIAN VISIT RATES AMONG DIFFERENT INCOME GROUPS, 1968

Age in Years	Less than $3000	$3000-$4999	$5000-$6999	$7000-$9999	$10,000+
5-14	2.56	2.99	3.69	4.05	4.44
15-64	4.57	4.43	4.23	4.27	4.55

SOURCE: Computed from data in [1], Tables 4 and 23.

these statistics, a still greater redistribution of services to the poor was desired, it would be necessary to take additional steps. For example, the poor could be exempted from the deductible and required to pay only a 20 percent coinsurance rate, the coinsurance provision to be waived after the expenditure of 2 or 3 percent of family income--for example, $100 or $150 per year. If, at the same time, a deductible of 10 percent of income were imposed on middle- and upper-income groups (and if these groups did not eliminate these payments through the purchase of supplementary coverage), ambulatory services would be strikingly reallocated to the poor (see Appendix D, Part 2).

V. A FINAL PHILOSOPHICAL NOTE

Underlying the two sets of goals we have just considered are two different philosophies about the role of government in contemporary society [69]. Our discussion of health insurance would be incomplete without some reference to this issue.

The first set of goals, that price must not be a barrier to medical services, derives from the view that society should assure ready access to certain goods or services--e.g., health care, education, and housing--for all citizens. Advocates of this position argue that such access is necessary for a minimally decent existence and is, in fact, the hallmark of a progressive society. This philosophy basically underlies the statement that "health care is a right."

Underlying the second set of goals is a different view, that society should be concerned only that each individual has an "adequate" income. Those who hold to this position emphasize a strategy of assuring income through such programs as Social Security, unemployment compensation, and public assistance programs, or, more recently, a guaranteed annual income. The individual is left with the responsibility of spending the income as he sees fit. To those who advocate this approach, provision of health insurance with last-dollar coverage is a proper concern of government because, in effect, it helps to assure an adequate income by preventing large losses from illness. By the same token, it is argued that early-dollar coverage is not a concern of government, because it deals with a set of issues quite distinct from that of providing adequate income. Because the benefits of health services consumed as a result of early-dollar coverage are largely qualitative--e.g., the relief of anxiety and the acquisition of prognostic information--each individual, it is contended, should be allowed the discretion of weighing an investment in such benefits against alternative uses of his resources (e.g., for better housing, food, clothing, and transportation.)

The confrontation between these two philosophies is likely to produce one of the most important domestic policy debates of the next

several years. As applied to health insurance, the implications of the choice between the two views are considerable. The share of society's resources devoted to medical care has increased sharply in the past twenty years, from 5 to 8 percent. This rise reflects the increased demand produced by additional private insurance coverage, as well as by expanded public insurance programs. Our estimates indicate that if a national insurance plan were enacted that fully covered all medical services, the share of Gross National Product devoted to health would rise to about 11 percent, valued at present prices. Although we have been unable to estimate to what degree a large deductible plan would reduce this share, it seems unlikely that the value would fall below 5 percent, the level of twenty years ago. In essence, American society, through its collective choice of a health insurance plan, will potentially be determining whether 5, 8, or 11 percent of its resources will be devoted to medical care.

Appendix A

EXPENDITURE ACCOUNTING

Throughout our discussion we consider only those expenditures on medical care services that we expect will be affected directly by national health insurance. Our expenditure figures are based on data from [70] and represent 80 percent of total expenditures on health services and supplies in fiscal year 1972. Our estimates are given in Table A-1, and the exclusions we have made are explained below.

Table A-1

HEALTH EXPENDITURES

	Expenditure (in billions)		Percent of Total	
Hospital, non-physician services	$28.25		45.9	
Inpatient physician services	5.02		8.2	
Total hospital services		$33.27		54.1
Outpatient physician services	7.15		11.6	
Outpatient ancillary services	3.04		4.9	
Total outpatient services		10.19		16.5
Dental	4.96		8.1	
Other professional	1.51		2.5	
Prescription drugs	5.41		8.8	
Eyeglasses and appliances	1.96		3.2	
Nursing homes	3.38		5.5	
Other health	0.86		1.4	
Total other health services		18.08		29.5
Total all health services		$61.54		

Because data in [70] were not suitably disaggregated for our purposes, we had to resolve the following issues to obtain the figures shown in Table A-1.

1. Data in [70] include all health-related expenditures, whereas we wished to consider only those expenditures likely to be affected by national health insurance. Our estimates therefore include only

consumers' out-of-pocket expenditures, expenditures under private insurance, and expenditures under three public programs--Medicare, Medicaid, and public General Hospital and Medical Care Programs. We have excluded expenditures under all other public programs, including, for example, Workman's Compensation and those administered by the Defense Department and the Veterans Administration. These exclusions amounted to $8.97 billion, or 11.6 percent of total expenditures on health services and supplies. We also excluded patient care expenditures financed by private philanthropy ($1.50 billion, 1.9 percent) and expenditures for prepayment and administration ($2.87 billion, 3.7 percent).

2. Data in [70] include all drug expenditures (prescription and non-prescription), whereas we did not wish to include any expenditures on non-prescription drugs (since we do not believe they will be included in a national plan). On the basis of data in [71] (supported by data in [72], Table 1-3), we estimate that one-third of the drug expenditure reported in [70], or $2.45 billion (3.2 percent of the total), is for non-prescription drugs.

3. Data in [70] give combined expenditures for inpatient physician, outpatient physician, and outpatient ancillary services, whereas our analysis requires separate expenditure estimates for each of these services. To disaggregate these components we have used data from [8] and [71]. Our calculations show that outpatient physician expenditures are 47 percent of the total reported; inpatient services are 33 percent; and outpatient ancillary services are 20 percent.

4. The statistics in [70] overstate the amount of expenditures for physician services because they include an unknown amount of double counting between Medicare and Medicaid (that is, the same expenditure is counted twice). We ignore this problem in our calculations because the maximum possible double counting is only 1 percent of the total ($0.78 billion, the entire amount of Medicaid expenditures).

Appendix B

COINSURANCE RATES BY SERVICE

DERIVATION OF COINSURANCE RATES

Hospital Services

There are no data on the distribution of coinsurance rates in the population; therefore, we obtained an average coinsurance rate by dividing out-of-pocket expenditure by total expenditure on hospital services. (Total expenditure is subject to the exclusions defined in Appendix A.) Thus, the 10 percent coinsurance rate for hospital services given in the text has been derived from the expression $2.71/(2.71 + 6.02 + 3.21 + 4.18 + 12.13) = 2.71/28.25 = 10$ percent, where 2.71 is out-of-pocket expenditure (in billions of dollars), 6.02 is expenditure under Medicare, 3.21 is expenditure under Medicaid, 4.18 is expenditure under General Hospital and Medical Care Programs, and 12.13 is expenditure under private health insurance plans [70].

Ambulatory Services

The current average coinsurance rate for ambulatory (outpatient physician and ancillary services) could not be obtained in as straightforward a fashion as for hospital services because in [70] these services and inpatient physician services are aggregated into a single figure (see Appendix A). To obtain the coinsurance rate for ambulatory services alone it was necessary first to calculate the coinsurance rate for inpatient physician and ambulatory services combined. As with hospital services we divided out-of-pocket expenditure by total expenditures. This calculation is as follows: $6.64/(6.64 + 5.78 + 2.01 + 0.007 + 0.78) = 6.64/15.22 = 44$ percent, where 6.64 is out-of-pocket expenditure for all physician and ambulatory ancillary services (in billions of dollars), 5.78 is expenditure on such services by private insurance companies, 2.01 is expenditure by Medicare, 0.007 is expenditure by General Hospital and Medical Care Programs, and 0.78 is expenditure by Medicaid.

To disaggregate this combined insurance rate of 44 percent into values for inpatient physician services on the one hand and ambulatory services on the other, we assumed, first, that the coinsurance rate for inpatient physician services was the same as for hospital services (10 percent), and, second, that the coinsurance rates for ambulatory physician and ambulatory ancillary services are equal to each other. Because inpatient physician services constitute 33 percent of total physician expenditures, the implied coinsurance rate for outpatient physician and ancillary services is 60 percent (0.33(10) + (1 - 0.33) 60 = 44). (Assuming that inpatient physician services are covered to the extent of only 75 percent rather than 90 percent yields a coinsurance rate for ambulatory services of 53 percent rather than 60 percent; thus our calculation is not very sensitive to errors in the assumption that inpatient physician services are covered to the same degree as hospital services.)

BIASES IN THE ESTIMATED COINSURANCE RATES

Hospital Services

To simply divide out-of-pocket expenditure by total expenditure understates the average coinsurance rate in the population, because individuals with high coinsurance rates tend to use fewer services and hence make fewer expenditures. (It also follows that the more sensitive demand is to change in price, the more our methodology understates the average coinsurance rate.) Thus, our estimate of 10 percent as the average coinsurance rate for hospital services is almost certainly low; it could therefore be argued that we have underestimated the change in demand to be expected with the various prototypical plans. We have not, however, adjusted the 10 percent coinsurance rate upward for two reasons:

1. A bias in our estimates of the responsiveness of the population to insurance acts to offset any understatement of the coinsurance rate (as discussed in Appendix C).

2. The 10 percent coinsurance rate passes the following validity test based on independent data indicating the percentage of the population that does not have insurance. If the percentage with no insurance considerably exceeded 10 percent, our estimate would be known to

be seriously low. If, however, the percentage with no insurance were much less than 10 percent, our estimate could be presumed to be reasonably accurate, since hospital insurance is typically nearly complete. To compute the percentage of the population with no insurance, we began with data from the National Health Survey [73]. These data show that 20 percent of the civilian population has no coverage for hospital services (this value includes the Medicare coverage of the over-65). However, the Survey data omit Medicaid, public assistance (referred to in our accounting as General Hospital and Medical Care), and certain other public programs, and downward adjustments of the 20 percent figure must be made to take each of these into account. Medicaid covers 6.5 percent of the population [74], but some individuals under Medicaid also have private coverage or Medicare; we therefore estimate that 4 percent of the population is covered only through Medicaid. In the case of public assistance and other public programs, no detailed data are available on the extent of coverage; however, public assistance programs financed 15 percent of total national hospital expenditures [70]. It is therefore reasonable to assume that the great majority of the 16 percent of the population not covered by private insurance, Medicare, or Medicaid were in effect covered by these programs. Thus it seems almost certain that the proportion of the population with no insurance is less than 10 percent, and that our estimated average coinsurance rate is not seriously in error.

Ambulatory Services

We have performed the same validity test (i.e., computed the percent of the population with no insurance) on the 60 percent estimate of the average coinsurance rate for ambulatory services as we did for hospital services. Seventy-one percent of the population in 1970 had private regular medical insurance coverage [75], but this type of coverage seldom includes outpatient services. Thirty-eight percent of the population had private major medical coverage [75], but the deductible in these policies means that there is little coverage of most ambulatory visits. Medicare and Medicaid provide relatively extensive benefits for ambulatory services, but they only cover around 15 percent of the

population. Thus, while the percentage of the population insured is high, the coverage is sufficiently scanty that our estimated 60 percent coinsurance rate could represent a serious underestimate. If so, we have underestimated the stress on the ambulatory care system the prototypical plans would cause (see Appendix D).

Appendix C

DERIVATION OF ESTIMATES FOR HOSPITAL SERVICES

RESPONSIVENESS OF DEMAND FOR HOSPITAL SERVICES TO INSURANCE

To compute the change in demand for hospital services one must have information on four aspects of hospitalization: admission rates, length of stay, expensiveness of hospital used (room and board rate), and utilization of ancillary services (e.g., lab tests and X-rays). The first two dimensions can be summarized as patient days and the last two as price per patient day. The change in the product of patient days and price per day is the change in demand for hospital services.

Our estimates of the responsiveness of demand to insurance are based on two studies [2,4] in which the coverage of different groups was changed, and on a third study [10] in which individuals with various kinds of insurance coverage were asked about their hospital utilization. Using [2] and [4] we ascertained the actual change in coinsurance in each study and then computed the change in demand as a function of the change in coinsurance. To make our estimates from these studies [2,4] applicable to the change in demand that would be caused by the prototypical full-coverage plan, we interpolated (linearly) the change in demand to the 10 percent to zero range of coinsurance (10 percent is the estimated average rate of coinsurance in the population; see Appendix B). For the survey data [10] we fitted a straight line to the observations and used the 10 percent to zero coinsurance portion.

Our justification for using an average coinsurance rate is our lack of information on the distribution of coverage in the population. Our estimates of demand change are therefore based on the assumption that a percentage point change in coverage causes the same change in demand at any level of coverage (that is, that the response function is linear). While this is an extreme assumption, departures from it are not likely to be of sufficient importance to affect our estimates appreciably. Our estimates would be overstated if, in [2] and [4], sicker individuals chose to belong to plans with more extensive coverage. However, we feel that any bias introduced by such adverse selection roughly offsets the

understatement of the average coinsurance rate in the population (see Appendix B).

Study [2], which incorporates data on all dimensions of demand, predicts a 7 percent increase in demand with the introduction of a full-coverage plan (Table C-1). For a second and independent estimate of the increase in demand, we have combined data from [10], which gives data on the change in room and board price, with [4], which provides data on the change in the number of patient days (Table C-1).

To obtain an estimate from [10] of the change in price per day that a full-coverage plan would cause, we have assumed that the change in ancillary services per day (for which no data are available) is the same as the value for the change in room and board price, 2 percent. Our estimate is not sensitive to errors in this calculation; if ancillary services were only half as responsive as room and board price, the change in price per day would be 1.5 percent rather than 2 percent. If ancillary services were twice as responsive, the change in price per day would be 3 percent, since such services are just under half of hospital price per day [80,81]. The results of [4] indicate that a full-coverage plan would cause patient days to rise 8 percent. (It might be noted that the estimate of the responsiveness of length of stay from [10] is consistent with the responsiveness of patient days in [4].) Adding the 2 percent increase in price per day and the 8 percent increase in patient days, we estimate from [4] and [10] that a full-coverage plan would raise demand by around 10 percent.

Given the values obtained from [2,4,10] and the formal confidence intervals available in [10], we suggest that the true figure for increase in demand for hospital services from a full-coverage plan very likely lies between 5 and 15 percent.

In the case of a 25 percent maximum coinsurance rate plan, there could be, as pointed out in the text, no increase in demand. The other extreme (if response is linear) occurs when 90 percent of the population is completely insured and 10 percent is uninsured. In this case the 25 percent maximum coinsurance plan would reduce the coinsurance rate from 100 to 25 percent for the 10 percent of the population that is uninsured. If we assume a linear relationship between insurance

Table C-1

STUDIES THAT PERMIT AN ESTIMATE OF CHANGES IN DEMAND FOR HOSPITAL SERVICES AFTER INTRODUCTION OF A FULL-COVERAGE PLAN[a]

Data Source	Percentage Change in Demand (interpolated to 10 percent to zero coinsurance range)
Williams (Ref. 2)[b]	7 (total expenditure)
Newhouse-Phelps (Ref. 10)[c]	2 (room and board price only)
Heaney-Riedel (Ref. 4)[d]	8 (patient days only)

[a]Although there are other data, we do not consider them reliable enough to report. For example, estimates in [76], [77], and [78] appear to contain serious biases because of the way the insurance variable was defined [17].

[b]Only the data from Plan "D" are used, because for the other plans in the study coinsurance rates cannot be computed or age and sex-adjusted rates are unavailable. At one time Plan "D" required a $4/day copayment and at another, no copayment. The average coinsurance rate represented by the $4 payment was estimated to be $4/$33.44 or 12 percent, where $33.44 was the average daily cost before the change. The 7 percent estimate of the change in total expenditure is derived in the following manner. First, we calculated average length of stay figures from the data presented for benefits per stay and benefits per day. We then used the average length of stay figures and the data given on patient days to calculate admission rates; the data on admission rates were then used with costs per stay to calculate total expenditure per person insured for each payment scheme. The 7 percent estimate may somewhat understate the total changes in demand for resources, because both before and after the change in insurance there was no cost to the consumer in choosing a more expensive hospital or in using more ancillary services. (The policy had a copayment rather than a coinsurance provision.) Hence, the change in price per day expressed as a function of a change in a coinsurance rate may be somewhat understated.

[c]To obtain estimates of how room and board price per day varied with insurance, a line was fitted using the method of two-stage least squares. The equation that predicted room and board price of the hospital selected was a function of the coinsurance rate (at the margin) and demographic variables. The difference in the dependent variable at coinsurance rates of 10 percent and zero was estimated and taken relative to the value at 10 percent (with the other variables in the equation set at their mean values). A two-stage least squares estimator was used to eliminate the potential effects of adverse selection, which would cause ordinary least squares estimates to be overstated if those who wanted to go to higher priced hospitals had selected better insurance.

[d]See following page.

Table C-1 (continued)

[d]Our estimate of an 8 percent change in patient days is based on the change in patient days in the experimental group reported in Table 9 and an estimated change in coinsurance rate from 31 percent to zero. The policy changed from one paying $15 per day for room and board plus all ancillary services to one paying the full semi-private room rate plus all ancillary services. The estimated 31 percent coinsurance rate is based on the average daily revenue of $65.89 in Connecticut hospitals in 1967 [79] and an estimate that 53.5 percent of the bill is for room and board [80]. The resulting expression is 0.31 = (0.535(65.89) -15)/65.89. Adjustments of our 8 percent estimate of the change in patient days to control for seasonality, or for a possibly different coinsurance rate for the length of stay component, result in negligible changes and we have not reported them here.

coverage and demand, the resulting change in demand would be three-fourths as great as when the coinsurance rate is reduced from 100 percent to zero. Using an estimate of a 10 percent increase in demand with introduction of a full-coverage plan, it appears that the 25 percent plan would cause about an 8 percent rise in demand. The linearity assumption in this interpolation is not critical because the theoretical maximum increase from this plan equals that caused by a full coverage plan, i.e., 10 percent.

METHODOLOGICAL CONSIDERATIONS

Two criticisms have been made of the methods we have used in this appendix and in Appendix D. First, it has been argued that our technique yields estimates that are too low because they define short-run rather than long-run response [82]. However, neither data from the United States [77] nor data from Canada support this argument [83, Table 2; 84, Table 3]. It has also been suggested that estimates based on our methodology are too low because they use the extent of the individual's insurance coverage to explain his demand, whereas in fact it is the average insurance coverage in his community that is the major determinant of demand [85]. However, the statistical evidence used to support this proposition has been shown to be faulty [17]; there is, furthermore, independent evidence that is not consistent with such a view [17].

Appendix D

DISTRIBUTION OF COVERAGE AND RESPONSIVENESS TO INSURANCE OF AMBULATORY PHYSICIAN SERVICES

In this appendix we first derive estimates for the distribution of coverage for ambulatory services and then calculate the responsiveness of demand to changes in coverage. On the basis of these values we estimate how much of an increase in demand for outpatient physician services will be created by the two prototypical plans (see Table 1 in the text). In the third part of the appendix we derive the figure on which we base our estimate of how much increase in demand for ambulatory physician service was caused by the Medicare and Medicaid programs.

DISTRIBUTION OF COVERAGE

In Appendix B we estimated that the average coinsurance rate for ambulatory services was 60 percent or more. In the present discussion we ignore the downward bias in our estimate of the average coinsurance rate (see Appendix B); our estimates of increase in demand must therefore be viewed as conservative.

Accepting 60 percent as the average coinsurance rate, we can establish upper and lower bounds on the distribution of insurance. To establish one bound we used the following reasoning: Given that the average coinsurance rate in the population is 60 percent, and assuming that all those who are insured have full coverage (i.e., no coinsurance), it follows that the percentage of the population uninsured is 60 percent ($0.60(100) + 0.40(0) = 60$). To establish the other bound we used a strategy based on the fact that there are almost no coinsurance rates greater than 25 percent [86,87, and Medicare Part B]. Assuming that everyone with insurance had the extreme value of 25 percent for a coinsurance rate, the implied percentage of the population uninsured is 47 percent ($0.47(100) + (1 - 0.47)25 = 60$). Thus, under these assumptions, the fraction of the population uninsured must lie between 47 and 60 percent.

To make a more precise determination of the value for the percentage uninsured for ambulatory care, we must know the distribution of coinsurance in the 0 to 25 percent range. In Appendix E we present data showing that it is reasonable, for our purposes, to assume that the average coinsurance rate among individuals who have insurance is 20 percent. If so, 50 percent of the population is insured (with an average 20 percent coinsurance rate), and 50 percent of the population has no insurance (0.50(100) + (1 - 0.50)20 = 60). These figures are the source of the first two columns of Table 1.

To simplify estimation of the distribution of insurance we have ignored the presence of deductibles, but neglecting deductibles should have no marked effect on our estimates of demand. Taking deductibles into account would have two effects that would roughly offset each other. On one hand, it would raise the "effective" coinsurance rate among those who we calculated had 20 percent coinsurance; on the other hand, it would lower the estimate of the percentage of the population that is uninsured (given our method of calculating this figure).

RESPONSIVENESS OF DEMAND TO CHANGES IN INSURANCE COVERAGE

We have made two estimates of the responsiveness of demand to change in coverage of ambulatory care, one for the 25 percent to zero range and the other for the 100 to 25 percent range of coinsurance. These estimates were then combined to obtain an estimate of the effect of a change from *no* insurance to *complete* insurance. The estimate for the 25 percent to zero range comes from a natural experiment in Palo Alto, California, in which a 25 percent coinsurance rate was imposed for ambulatory visits that had previously been free. The resulting change in expenditures, expressed relative to expenditures at 25 percent coinsurance, was 35 percent [9, Table 4, age adjusted figure]. We have arbitrarily adjusted this figure downward to 30 percent to make it applicable to the zero to 20 percent range of coinsurance shown in Table 1a.

The estimate for the 100 to 25 percent coinsurance range must be arrived at indirectly because there are no reliable published data. To obtain a rough estimate we have used unpublished data from the 1970 survey of the Center for Health Administration Studies at the University of

Chicago. Our procedure was to compare utilization of ambulatory services by the group with no insurance (100 percent coinsurance) to utilization by a group with approximately 20 percent coinsurance; utilization by this latter group was then adjusted to approximate the utilization that would occur at 25 percent coinsurance. This calculation yielded a 60 percent difference between the groups. The detailed procedure through which we obtained the change in demand between 100 and 25 percent coinsurance is described next.

The specific characteristics of the two groups to be compared were as follows: The first (Group 1) consisted of those under 65 years of age who had no insurance in force at the end of the year and who had received no Medicaid benefits during the year. The second (Group 2) consisted of those under 65 with group insurance but with no individual insurance in force at the end of the year for outpatient physician care. (The over-65 individuals were excluded from both groups because they would all have been assigned to Group 2 because of their Medicare coverage, and this allocation would distort the comparison.) An obvious problem we faced was to estimate a coinsurance rate for the second group, i.e., for those who had insurance. To do this we used our estimate that the average coinsurance rate for insured individuals is 20 percent and that most coinsurance rates are close to 20 percent (see Appendix E). A comparison of the difference in expenditures of Groups 1 and 2 will therefore yield an estimate of the effect of changing the coinsurance rate from 100 percent to 20 percent. The data indicate that the difference in expenditure between the two groups was 66 percent; we have arbitrarily reduced this value to 60 percent to make it applicable to the narrower 100 to 25 percent range of coinsurance. We should note parenthetically that our calculations would not be much influenced by any likely deviation from the assumed average 20 percent coinsurance rate.

In assessing this 60 percent figure, it is important to ascertain whether Groups 1 and 2 are dissimilar in ways other than insurance coverage that could affect the observed difference in expenditure. In fact, such dissimilarities exist. Those without insurance (Group 1) are more likely to be unemployed, to be in poorer health, and to have a lower price of time than those with insurance (Group 2). Poor health and low

time price tend to increase expenditure independent of insurance, and if these factors were controlled for, the difference in expenditure between Groups 1 and 2 would be greater. On the other hand, there is an offsetting effect because those in Group 1 tend to have lower incomes than those in Group 2. Income tends to decrease expenditure independently of insurance and, if income were controlled for, the difference in expenditure would be less than we estimate. However, on balance, the difference in health status and time price should have a larger effect on expenditure than the difference in income, because the responsiveness of expenditure to income (with insurance held constant) is not very large [10]. We therefore feel our estimate of a 60 percent increase is conservative.

In our comparison of Groups 1 and 2, we ignored the influence that a small deductible (such as $50 or $100) might have. Our justification for ignoring such deductibles, even though they were sometimes present in the Group 2 policies, is that their effect is impossible to quantify. If we had taken account of the influence of deductibles, the 60 percent value for change in demand would have been higher; this further emphasizes that the 60 percent figure is indeed conservative. (Note that in comparing the groups there should be no problem of adverse selection, because the insured group (Group 2) generally obtained their coverage as part of employment and therefore did not self-select themselves for coverage on the basis of a tendency to be sick.)

Combining our estimates for the zero to 25 percent and 25 to 100 percent coinsurance ranges, we estimate that full coverage would cause an increase in demand for ambulatory services of 120 percent (120 = 100(1.6(1.35) - 1) if there were no coverage before.

Our figure of 60 percent for the increase in demand for the 100 to 25 percent range of coinsurance is similar to the 40 percent increase that can be derived from a study by Fuchs and Kramer [88] using their constant elasticity demand function with an elasticity of 0.25. We do not wish to place much weight on the Fuchs-Kramer estimates, however, because they are subject to biases whose magnitude and direction are uncertain [17]. For various reasons, other data are inappropriate for the purpose of estimating the relationship between insurance and the demand

for outpatient physician services. Data from a 1963 national survey do not yield a reliable estimate of the effect of insurance, because nearly 90 percent of the sample population had no effective coverage for ambulatory physician services [10]; hence, there is little variation in the coverage observed in the sample. Data obtained from studies in which the insurance coverage of an entire area was changed, as in Great Britain and Canada [48,50,83,84,89], are not appropriate to estimating changes in demand, because, as we have discussed in the text, when the coverage of large numbers of individuals is changed, the supply system may not be able to fully respond, i.e., the observed change in utilization will be less than the change in demand. Time series data have also been used to estimate the responsiveness of demand [90], but the analytic effort was unsuccessful [17].

THE CHANGE IN DEMAND CAUSED BY MEDICARE AND MEDICAID

In this section we calculate how much the introduction of Medicare and Medicaid added to total demand for ambulatory services in the nation. The calculation was carried out in the following way: We first estimated the increase in demand among the Medicare-Medicaid group and then multiplied this value by the share of physician visits that was attributable to this group before the inception of the new programs. (Because the Medicare-Medicaid group has a higher than average visit rate, simply multiplying the demand increase by the percentage of the population that they represent would yield an underestimate.)

In the previous section we estimated that a change from no coverage to full coverage would produce a change in demand for ambulatory services of 120 percent. However, the provision of ambulatory coverage to the Medicare-Medicaid group must have increased demand less than this because, first, some of the groups already had some insurance and, second, Medicare did not provide full coverage but rather a $50 deductible and a 20 percent coinsurance rage. Nevertheless, to derive an initial estimate we have used the 120 percent figure.

The Medicare population accounted for 13.4 percent of physician visits before the introduction of the Medicare-Medicaid legislation [15, Table A]. The share of visits accounted for by the Medicaid population before the legislation is not known, but we do know that the

population covered is about 1/3 the size of that covered by Medicare [74]. We have, therefore, raised the 13.4 percent value by 1/3, to 18 percent, to obtain an estimate of the proportion of visits accounted for by the Medicare and Medicaid population in the pre-insurance period (18 percent is probably an overestimate because the under-65 Medicaid visit rate was almost certainly below that of the Medicare rate). Multiplying the 120 percent figure for the increase in demand in the Medicaid and Medicare group by 18 percent yields an estimate of 22 percent as the increase in demand in the overall population caused by these programs.

Because the 22 percent figure is derived from values that are probably too high, 22 percent is probably an overestimate of the change in demand. We have, therefore, adjusted the 22 percent figure downward and have estimated that the Medicare and Medicaid legislation caused demand to rise by some 10 to 15 percent. As explained in the text, the increase in expenditure could be above or below the estimated increase in demand, but as a first approximation the two have been taken as equal. Actual expenditures on ambulatory care increased by almost 6 percent between fiscal year 1966 and fiscal year 1967 (the first year of the new programs) [91], a finding that tends to validate our estimate of a 10-15 percent demand increase.

Appendix E

COINSURANCE RATES FOR OUTPATIENT PHYSICIAN SERVICES

Our estimates in Appendix D are based on the simplifying assumption that all those who are insured have an average coinsurance rate of 20 percent. To arrive at this figure, we have examined the insurance coverage provided by commercial companies [87], the government [74], and Blue Shield [86]. Over 60 percent of individuals covered for outpatient visits through commercial companies (around 25 percent of the population) have a coinsurance rate of 20 percent; the remainder are mainly at 15 and 25 percent coinsurance. Over half those covered by government plans have a 20 percent coinsurance rate; this figure is derived in the following way: Medicare, which has a 20 percent coinsurance rate, covers 10 percent of the population, whereas Medicaid, which covers 6 percent, has zero coinsurance. We can ignore individuals with Blue Shield policies, because as of 1968 (the most recent year for which there are data) few individuals who held such policies had coverage for outpatient services [86, Table 3-2]. (Our comparison of the insured and uninsured groups in Appendix D, Part 2, excludes those with Medicare and Medicaid. However, taking this exclusion into account would not appreciably affect our estimate that the average coinsurance rate in Group 2 was 20 percent, because the remaining individuals appear, if anything, to be more heavily concentrated at a 20 percent coinsurance rate.)

Although the assumption that all those with insurance have an average coinsurance rate of 20 percent is an oversimplification, the error involved does not have a significant effect on the two estimates into which it enters. In the first we used the 20 percent figure to calculate that 50 percent of the population is uninsured (Appendix D, Part 1). Because the upper and lower bounds on this figure are 47 and 60 percent, our 50 percent estimate cannot be appreciably in error. The average 20 percent coinsurance rate has also been used to estimate the difference in expenditure (that is, the change in demand) between coinsurance rates of 100 and 25 percent (Appendix D, Part 2). As noted in Appendix D, however, a true value slightly different from 20 percent would not noticeably affect this estimate.

Appendix F

ESTIMATED INCREASE IN INPATIENT AND AMBULATORY EXPENDITURES FOR A 25 PERCENT MAXIMUM COINSURANCE RATE PLAN AND FULL-COVERAGE PLAN

Our estimates shown in Fig. 2 for inpatient expenditures are based on the extremes of the range of possible demand increases derived in Appendix C. The conservative estimates are based on values of zero and 5 percent increases in demand for the 25 percent coinsurance and full-coverage plans respectively, whereas the liberal estimates are based on values of 8 and 15 percent increases for the two plans respectively. These percentage increases are multiplied by 0.77, the share of inpatient and ambulatory services attributable to inpatient services (Appendix A).

Our estimates for ambulatory expenditures include both physician and ancillary services. Our conservative estimates for physician services are 30 and 75 percent increases in demand for the 25 percent coinsurance and the full-coverage plans respectively (see Appendix D); to obtain liberal estimates we arbitrarily increased the conservative estimates by a factor of two-thirds (to 50 and 125 percent, respectively). The estimated increases in demand for ancillary services are half those of physician services (see text). The increases for physician and ancillary services are multiplied by 0.16 and 0.07, their respective shares of the total (Appendix A).

Combining the percentage increases for inpatient and ambulatory services, we obtained an estimated total increase in demand, which we converted to dollar expenditure by multiplying by $43.5 billion, the expenditures in fiscal year 1972 (see Appendix A).

REFERENCES

1. C. E. Phelps and J. P. Newhouse, *Coinsurance and the Demand for Medical Services*, R-964-OEO/NC, The Rand Corporation, Santa Monica, April 1973. (An abridged version of this paper is forthcoming in *Review of Economics and Statistics*, 1974.)

2. R. Williams, "A Comparison of Hospital Utilization by Costs and by Types of Coverage," *Inquiry* 3:28-42, 1966.

3. M. R. Greenlick and B. J. Darsky, "A Comparison of General Drug Utilization Under a Drug Prepayment Plan," *Am J Public Health* 58:2121-2136, 1968.

4. C. T. Heaney and D. C. Riedel, *From Indemnity to Full Coverage Changes in Hospital Utilization*, Blue Cross Association, Chicago, Research Series 5, 1970.

5. D. B. Hill and J. E. Veney, "Kansas Blue Cross/Blue Shield Outpatient Benefits Experiment," *Med Care* 8:143-158, 1970.

6. C. E. Lewis and H. Keairnes, "Controlling Costs of Medical Care by Expanding Insurance Coverage, *N Engl J Med* 282:1405-1412, 1970.

7. M. Morehead, R. Donaldson, and A. Zanes, "Dental Service at Teamster Comprehensive Care Program," *J Am Dent Assoc* 83:601-606, 1971.

8. C. E. Phelps and J. P. Newhouse, *The Effects of Coinsurance on Demand for Physician Services*, R-976-OEO, The Rand Corporation, Santa Monica, June 1972. An abridged version of this paper was published as "Effects of Coinsurance: A Multivariate Analysis," *Social Security Bulletin* 35:20-29, 1972.

9. A. N. Scitovsky and N. M. Snyder, "Effect of Coinsurance on Use of Physician Services," *Social Security Bulletin* 35:3-19, 1972.

10. J. P. Newhouse and C. E. Phelps, "Price and Income Elasticities for Medical Care Services," presented at a conference of the International Economics Association, Tokyo, Japan, April 1973 (Proceedings of conference in press).

11. United States Department of Health, Education and Welfare, "Report of the National Conference on Medical Costs," June 27-28, 1967, Washington, D.C., 1967, p. 89.

12. United States Department of Health, Education and Welfare, "A Report to the President on Medical Care Prices," Washington, D.C., 1967.

13. E. M. Kennedy, *In Critical Condition: The Crisis in America's Health Care*, Simon and Schuster, New York, 1972, p. 203.

14. R. M. Nixon, Message to the Congress on the Comprehensive Health Insurance Plan, Office of the White House Press Secretary, Washington, D.C., February 6, 1974, mimeo.

15. United States Department of Health, Education and Welfare, Social Security Administration, "Analysis of Health Insurance Proposals Introduced in the 92nd Congress," Printed for the use of the Committee on Ways and Means, Washington, D.C., August 1971.

16. R. N. Rosett and L. F. Huang, "The Effect of Health Insurance on the Demand for Medical Care, *J Polit Econ* 81:281-305, 1973.

17. J. P. Newhouse and C. E. Phelps, *On Having Your Cake and Eating It Too: An Analysis of Estimated Effects of Insurance on Demand for Medical Care*, R-1149-NC, The Rand Corporation, Santa Monica, April 1974.

18. United States Department of Health, Education and Welfare, Public Health Service, National Center for Health Statistics, "Volume of Physician Visits," Washington, D.C., 1968 (*Vital and Health Statistics*, Series 10, No. 49).

19. United States Department of Health, Education and Welfare, Public Health Service, National Center for Health Statistics, "Current Estimates, 1971," Washington, D.C., 1973 (*Vital and Health Statistics*, Series 10, No. 79), Table 21.

20. United States Congress, *National Health Insurance*, Hearings before the Committee on Finance, United States Senate, 92nd Congress, 1st Session, April 26, 27, and 28, 1971. Washington, D.C., 1971.

21. M. S. Feldstein, "A New Approach to Health Insurance," *Public Interest* 23:93-105, 1971.

22. M. V. Pauly, "An Analysis of Government Health Insurance Plans for Poor Families," *Public Policy* 19:489-521, 1971.

23. M. S. Feldstein and E. Allison, "Tax Subsidies of Private Health Insurance: Distribution, Revenue Loss and Effects," Harvard Institute of Economic Research Discussion Paper No. 237, Cambridge, April 1972.

24. B. M. Mitchell and R. J. Vogel, *Health and Taxes: An Assessment of the Medical Deduction*, R-1222-OEO, The Rand Corporation, Santa Monica, August 1973.

25. C. E. Phelps, *The Demand for Health Insurance: A Theoretical and Empirical Investigation*, R-1054-OEO, The Rand Corporation, Santa Monica, July 1973.

26. United States Bureau of the Census, "Consumer Income," Washington, D.C. (*Current Population Reports*, Series P-60, No. 87), 1973.

27. The Institute of Medicine, National Academy of Sciences, "The Report of the Panel on Implications of a Categorical Catastrophic Approach to National Health Insurance," mimeo, 1973.

28. J. P. Acton, *The Demand for Health Care Among the Urban Poor with Special Emphasis on the Role of Time*, R-1151-OEO/NYC, The Rand Corporation, Santa Monica, April 1973.

29. J. L. Simon and D. B. Smith, "Change in Location of a Student Health Service: A Quasi-experimental Evaluation of the Effects of Distance on Utilization, *Med Care* 11:59-67, 1973.

30. J. E. Weiss and M. R. Greenlick, "Determinants of Medical Care Utilization," *Med Care* 8:456-462, 1970.

31. R. Gronau, "The Intrafamily Allocation of Time," *Am Econ Rev* 63:634-651, 1973.

32. J. Heckman, "Shadow Prices, Market Wages, and Labor Supply," *Econometrica* (in press).

33. B. Weisbrod and R. Fiesler, "Hospitalization Insurance and Hospital Utilization," *Am Econ Rev* 51:126-132, 1961.

34. American Hospital Association, *The 1973 AHA Guide to the Health Care Field*, The Association, Chicago, 1973.

35. J. A. Rafferty, "Patterns of Hospital Use: An Analysis of Short-run Variations," *J Polit Econ* 79:154-165, 1971.

36. A.D.B. Chant et al., "Another Approach to the Hernia Waiting-list," *Lancet* 2:1017-1018, 1972.

37. Editorial: "An Answer to the Surgical Waiting-list?" *Lancet* 1:23-28, 1972.

38. J. W. Todd, "Priorities in Medicine," *Lancet* 1:1106-1110, 1973.

39. P. MacAvoy, "The Effectiveness of the Federal Power Commission, *Bell Journal of Economics and Management Science* 1:271-303, 1970.

40. P. MacAvoy, "The Formal Work-product of the Federal Power Commission," *Bell Journal of Economics and Management Science* 2:379-395, 1971.

41. R. C. Noll, *Reforming Regulation*, The Brookings Institution, Washington, D.C., 1971.

42. G. J. Stigler, "The Theory of Economic Regulation," *Bell Journal of Economics and Management Science* 2:3-21, 1971.

43. G. W. Hilton, "The Basic Behavior of Regulatory Commissions," *Am Econ Rev* 62:47-54, 1972.

44. W. A. Jordan, "Producer Protection, Prior Market Structure, and the Effects of Government Regulation," *Journal of Law and Economics* 15:151-176, 1972.

45. J. P. Newhouse and J. P. Acton, "Compulsory Health Planning Certificates of Need and National Health Insurance," presented at a Conference on Health Planning, Certificates of Need, and Market Entry, American Enterprise Institute, June 1972.

46. R. C. Noll, "The Consequences of Public Utility Regulation of Hospitals," presented at a conference of the Institute of Medicine on Regulation in the Health Industry, Washington, D.C., January 7-9, 1974.

47. H. Klarman, "Increase in the Cost of Physician and Hospital Services," *Inquiry* 7:22-36, 1970.

48. P. E. Enterline et al, "The Distribution of Medical Services Before and After "Free" Medical Care--The Quebec Experience," *N Engl J Med* 289:1174-1178, 1973.

49. United States Department of Health, Education and Welfare, Social Security Administration, Office of Research and Statistics, *Medical Care Expenditures, Prices, and Costs: Background Book*, Washington, D.C., September 1973, Table 2, p. 25.

50. W. H. Stewart and P. E. Enterline, "The Effects of National Health Service on Physician Utilization and Health in England and Wales," *N Engl J Med* 265:1187-1194, 1961.

51. R. G. Beck, "An Analysis of the Demand for Physicians' Services in Saskatchewan," Ph.D. dissertation, University of Alberta, 1971.

52. A. Donabedian, "An Evaluation of Prepaid Group Practice, *Inquiry* 6:3-27, 1969.

53. U. Reinhardt, "A Production Function for Physician Services," *Rev Econ Statist* 54:55-56, 1972.

54. K. R. Smith, M. Miller, and F. Golladay, "An Analysis of the Optimal Use of Inputs in the Production of Medical Services," *Journal of Human Resources* 7:208-225, 1972.

55. W. B. Schwartz, "Medicine and the Computer: The Promise and Problems of Change," *N Engl J Med* 283:1257-1264, 1970.

56. W. B. Schwartz et al. "Decision Analysis and Clinical Judgment," *Am J Med* 55:459-472, 1973.

57. R. J. Haggerty, "The Boundaries of Health Care," *The Pharos* 35:106-111, 1972.

58. B. Woodhall and S. Jablon, "Prospects for Further Increase in Average Longevity," *Geriatrics* 12:586-591, 1957.

59. S. S. Schor et al., "An Evaluation of the Periodic Health Examination: The Findings in 350 Examinees Who Died," *Ann Int Med* 61:999-1005, 1964.

60. M. Feinleib and M. Zelen, "Some Pitfalls in the Evaluation of Screening Programs," *Arch Environ Health* 19:412-415, 1969.

61. L. Kuller and S. Tonascia, "Commission on Chronic Illness Follow-up Study: Comparison of Screened and Nonscreened Individuals," *Arch Environ Health* 21:656-665, 1970.

62. S. Shapiro, "Automated Multiphasic Health Testing: Efficacy of the Concept," *Hospitals* 45:45-48, 1971.

63. B. Bates and J. A. Yellin, "The Yield of Multiphasic Screening," *JAMA* 222:74-78, 1972.

64. J. A. Schoenberger et al. "Current Status of Hypertension Control in an Industrial Population," *JAMA* 222:559-562, 1972.

65. C. Bombardier et al, "Periodic Health Examinations and Multiphasic Screening, *CMA J* 109:1123-1127, 1973.

66. J. P. Acton, *Evaluating Public Programs to Save Lives: The Case of Heart Attacks*, R-950-RC, The Rand Corporation, Santa Monica, January 1973.

67. United States Department of Health, Education and Welfare, Public Health Service, National Center for Health Statistics, "Persons Hospitalized by Number of Hospital Episodes and Days in a Year: United States-1968," Washington, D.C., 1971 (*Vital and Health Statistics*, Series 10, No. 64), Tables 1 and 17.

68. J. P. Newhouse, "A Design for a Health Insurance Experiment," *Inquiry* 11 (in press).

69. E. R. Fried et al., *Setting National Priorities: The 1974 Budget*, The Brookings Institution, Washington, D.C., 1973.

70. B. S. Cooper and N. L. Worthington, "National Health Expenditures, 1929-1972," *Social Security Bulletin* 36:3-19,40, 1973.

71. R. Andersen and O. W. Anderson, *A Decade of Health Services*, University of Chicago Press, 1967.

72. United States Department of Health, Education and Welfare, Social Security Administration, "Prescription Drug Data Summary, 1972," Washington, D.C., 1973.

73. United States Department of Health, Education and Welfare, Public Health Service, National Center for Health Statistics, "Hospital and Surgical Insurance Coverage Among Persons Under 65 Years of Age in the United States, 1970," Washington, D.C. (*Monthly Vital Statistics Report*, Vol. 21, No. 9, Supplement 2, December 18, 1972).

74. United States Department of Health, Education and Welfare, *Report of the Task Force on Medicaid and Related Programs*, Washington, D.C., 1970.

75. Health Insurance Institute, *Source Book of Health Insurance Data 1971-1972*, The Institute, New York, 1972.

76. G. Rosenthal, *The Demand for General Hospital Facilities*, American Hospital Association, Chicago, 1964.

77. M. S. Feldstein, "Hospital Cost Inflation: A Study of Nonprofit Price Dynamics," *Am Econ Rev* 61:853-872, 1971.

78. K. Davis and L. B. Russell, "The Substitution of Hospital Outpatient Care for Inpatient Care," *Rev Econ Statist* 54:109-120, 1972.

79. *Hospitals, Guide Issue*, 42, August 1, 1968, p. 442.

80. Health Insurance Association of America, "A Comparison of Group Medical Care Insurance Benefits to Charges," The Association, New York, 1968, mimeo.

81. K. Davis and B. Foster, *Community Hospitals: Inflation in the Pre-Medicare Period*, Washington, D.C., 1972, Table 35.

82. M. S. Feldstein, "Econometric Approaches to Health Economics," presented at the Winter 1972 meetings of the Econometric Society, Toronto (to be published in *Frontiers of Quantitative Economics*, II), edited by D. Kendrick and M. Intriligator, North Holland, Amsterdam.

83. B. Straight, "Reducing the Incidence of Office and Home Visits in a Medical Service Plan by Use of Coinsurance," *Proceedings of a Conference of Actuaries in Public Practice*, Chicago, 1962.

84. Saskatchewan Medical Care Insurance Commission, *Annual Report*, 1972, Table 3.

85. P. B. Ginsberg and L. M. Manheim, "Insurance, Copayment, and Health Services Utilization: A Critical Review," *Economics and Business Bulletin* 25:142-153, 1973.

86. L. S. Reed and W. Carr, *The Benefit Structure of Private Health Insurance, 1968*, Washington, D.C., 1970.

87. Health Insurance Association of America, *A Current Profile of Group Medical Expense Insurance in Force*, The Association, New York, February 1972.

88. V. R. Fuchs and M. Kramer, *Determinants of Expenditures for Physicians' Services in the United States, 1948-1968*, National Bureau of Economic Research, New York, 1972.

89. R. F. Badgley et al., "The Impact of Medicare in Wheatville, Saskatchewan 1960-1965," *Can. J. of Public Health* 58:101-108, 1967.

90. M. S. Feldstein, "The Rising Price of Physicians' Services," *Review of Economics and Statistics* 52:121-133, 1970.

91. D. P. Rice et al., "Personal Health Care Expenditures of the Aged and Non-aged, Fiscal Years 1966 and 1967," *Research and Statistics Note* No. 11, June 14, 1968, Social Security Administration, Washington, D.C.