# *The Development of Health Economics*

## —— an American Perspective ——

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## INTRODUCTION

### Scope

Health economics may be defined as "the application of economic theory and econometric methods to the study of processes determining the health of pupulations, especially health care financing and delivery". Traditionally, its primary focus has been on health care financing and delivery, but it also contains within its purview studies of factors related to public health, such as smoking and neo-natal mortality rates. Thus it excludes purely descriptive studies, and it also excludes analytical studies that are grounded in other disciplines than economics, such as psychology, sociology, or political science.

Health economics has developed to include three distinct types of analysis. First, economic appraisal: the application of cost-benefit analysis, cost-effectiveness analysis, and related methods to the evaluation of health-related programs and interventions. Second, positive analysis. Health economics seeks to understand and explain the behavior of consumers, physicians, hospitals and insurance companies. It seeks to illuminate the causal processes that determine health-related outcomes of interest to policy-makers, such as health status measures, costs, and access to health care. Third, health economics includes normative analysis: the study of the efficiency and equity implications of market processes and government interventions.

All three types of analysis have a practical orientation. Policy-makers need to know which programs are able to accomplish given objectives most efficiently. They also often need to be able to anticipate behavioral responses to policy changes. Finally, they need to know how well the market accomplishes certain tasks without government intervention, how well the government can do them in its stead, and when government intervention would have such negative consequences that the market, in spite of its flaws, should be left alone(or vice versa).

The focus of this survey is on the development of health economics in the United States, specifically as it pertains to health care financing and delivery. Less attention will be given to the development of methods for economic appraisal, which address the first of the three objectives listed: since the United States health care system relies heavily on markets, U.S. health economics has focused on the functioning of markets and how different types of government intervention affect them. We hope our survey will remain of interest to non-US readers. Many countries in recent years, disappointed with the performance of their relatively centralized, planned health care systems, have been exploring market-oriented alternatives.

Space limitations dictate that the coverage of this survey be highly selective. It does not even claim to be representative. We hope nonetheless, by pointing out some of the key features, to convey a reasonably accurate understanding of the whole.

Recency of interest in health economics

Health economics finds antecedents as far back as Adam Smith. As Martin Gaynor has pointed out recently (Gaynor, 1994), Adam Smith made reference to the economic importance of their reputation to physicians, more than two hundred years ago:

> 'A physician's character is injured when we endeavor to persuade the world he kills his patients instead of curing them, for by such a report he loses his business.'(Smith, 1978, p. 399)

Smith also made remarks that can be viewed as anticipating modern questions concerning the benefits of medical licensure. But by and large economists have paid relatively little attention to the health care market until recently. The first special session devoted to the economics of medical care at the American Economic Association meetings was held in 1951 (Ginzberg, 1951); the Conference on the Economics of Health Services in 1962 at Ann Arbor, Michigan, was the first to bring together economists interested in health services (Klarman, 1970); and the first professional economics journal devoted to health economics, the Journal of Health Economics, began publishing only in 1982.

## THE DEVELOPMENT OF METHODS FOR ECONOMIC APPRAISAL

The earliest work in economic appraisal relied on cost-benefit analysis. In cost-benefit analysis, the costs and benefits of a program, such as syphilis control (Klarman, 1963), are enumerated, individually estimated, summed and compared with each other. Early research on cost-benefit methodology grappled with several problems, including: (1) the quantification of non-monetized costs and benefits such as the services of housewives; (2) logical problems such as whether to net consumption out of a person's earnings in valuing the person's output; (3) the choice of a discount rate, to evaluate future costs and benefits (Klarman, 1965). Over time it became clear that cost-benefit analysis had two apparently irreducible flaws: (1) since it tries to assign a monetary value to indirect benefits including economic production gains, it assigns less value to improving the health of the less economically productive members of society, such as the poor and the elderly; (2) it has great difficulty assigning meaningful monetary values to intangible costs and benefits (Torrance, 1986). Estimating willingness to pay and willingness to receive is theoretically the correct way to solve the latter problem, but in practice this has proved difficult to implement (Torrance, 1986; Klarman, 1982).

As the limitations of cost-benefit analysis were becoming more apparent, an alternative began to emerge in the form of cost-utility analysis, a variant of cost-effectiveness analysis. Cost-effectiveness analysis(CEA) compares the costs of two or more programmes intended to achieve the same effect. The results of a cost

-effectiveness analysis are typically expressed in dollars per life-year saved, or per mm Hg reduction in blood pressure, etc. CEA in this form has three fundamental limitations: (1) since the outcomes of different programs vary, it can be difficult to evaluate a single CEA ratio on its own; (2) the cost-effectiveness of programs measured in different units cannot be compared; and (3) CEA cannot be used to evaluate programs with different types of clinical effects -- such as reductions in both morbidity and mortality (Torrance, 1986).

The use of health status indexes such as quality-adjusted life-years (QALYs), introduced in 1970 (Fanshel and Bush, 1970; Torrance, 1970), provided a way to remedy these deficiencies of simple cost-effectiveness analysis. The quality adjustment in QALYs is a weight, normally ranging from 0 (death) to 1 (healthy state), estimated based on researcher judgment or elicited in some manner from subjects. The use of QALYs allows all cost-effectiveness analyses to be expressed in a common unit: dollars per QALY. This directly allows appraisal of programs with different types of clinical effects, as well as comparisons of programs with each other. Over time, as the dollars per QALY of more and more programs are measured, it also becomes possible to assess a single program, just as with cost-benefit analysis (Torrance, 1986). QALYs have been used mostly to generate league tables -- tables allowing the direct comparison of a wide range of programs and interventions.

The various methods used for generating QALYs, however, appear to yield different results. Hornberger et al. (1992) compared six methods for determining QALY weights and found poor correlations among the results, especially when data were evaluated at the individual level.

Alternatives to the QALY have been proposed recently. Murray et al. have suggested the disability-adjusted life year (DALY) (World Bank, 1993). It has just begun receiving attention, mostly in developing countries. Mehrez and Gafni (1989) have deepened the debate over QALYs by proposing an alternative, the health-years -equivalent (HYE). HYEs are measured using a more complicated procedure than QALYs, which involves judgment under uncertainty (Mehrez and Gafni, 1991). Recently, Buckingham (1993) and Culyer and Wagstaff (1993a) have claimed that the procedure for obtaining HYEs is unnecessarily complicated and achieves nothing that QALYs do not already. Gafni, Birch and Mehrez (1993) counter, among other arguments, that thei: critics are confounding choice under certainty and under uncertainty. They view their approach as superior because more consistent with von Neumann-Morgenstern axioms of expected utility theory and because it more readily allows a carefully reasoned departure from those axioms (which they grant is probably necessary). They are ultimately seeking to ground the development of methods for measuring health status utilities on the theory of utility under uncertainty, and to let it follow that development -- and thus to attach economic appraisal methods more firmly to economic theory.

## POSITIVE ANALYSIS OF THE HEALTH CARE SECTOR

Positive analysis of the health care sector seeks to answer such questions as: will the health status of Medicare beneficiaries change if physicians' fees are altered? Does competition among hospitals head to higher or lower hospital costs? What effect would reducing the tax subsidization of health insurance have on health care expenditures? Our review begins by following the development of analyses of the demand for health care, paying particular attention to the RAND Health Insurance Experiment and to Michael Grossman's theoretical work on the demand for health. The markets for hospital and physician services will then draw our attention. (We pass over the market for health insurance, since it is of less relevance to non-U.S. readers.) We will then consider studies attempting to explain the reasons for the escalation in health care costs.

Especially since the inception of Medicare and Medicaid in 1966, government has assumed an important role in the health care system. Health economists have proposed government interventions, based on theoretical and empirical analyses. They have also analyzed their effects on the insurance, physician and hospital services markets. We will focus our attention particularly on the development of the Diagnosis Related Groups (DRG) system for hospital payment and the Resource-Based Relative Value Scale (RBRVS) for physician payment.

### The demand for medical care

Several researchers estimated price elasticities of demand for various types of health care services during the sixties and seventies. This reflected more than an academic interest: if price elasticities were virtually zero, there would be less reason to include deductibles and co-payments in health insurance policies. Over time it became clear that the elastictities were greater than zero and below one for most types of services; but within that range estimates varied widely (see Newhouse [1978] for a review). In part this was due to the use of different methodologies (Newhouse, 1981), all of which were subject to their own biases.

Congressional and other debates over alternative health care reform plans were hampered by this imprecision. Meanwhile, the negative income tax experiments of the 1960s had shown that social experimentation could yield valuable information. These circumstances set the stage for the RAND Health Insurance Experiment (HIE), planning for which began in 1971. The RAND HIE set out to answer two broad questions: how does medical care consumed vary with co-payment and deductible amounts, and what are the health consequences of differences in utilization? To answer these questions, Joseph Newhouse and his colleagues conducted an elaborate randomized experiment. Approximately 2,000 nonelderly families, from six areas of the country, were randomly assigned to insurance plans with varying levels and combinations of deductibles and co-insurance. Additional families were also enrolled in

a well-established prepaid group practice, or Health Maintenance Organization (HMO), the Group Health Cooperative of Puget Sound in Seattle, WA(Newhouse et al., 1993).

Data were collected mostly during the mid-to late seventies, and analyzed during the eighties. The RAND HIE conclusively demonstrated that cost-sharing markedly reduces use of all types of services (outpatient, inpatient, etc.) among all types of people. For example, per-person expenditures on the plan where families had to pay 95 percent of charges, up to a yearly maximum of $1,000, were about 75 percent of per-person expenditures for families on the free care plan. These reductions in utilization had little discernible effect on health outcomes: what effects there were (less detection and correction of blood pressure and inadequate vision among the poor) could be remedied economically with targeted screening programs. The HIE also revealed that HMO members were hospitalized 40 percent less frequently than individuals on the free care plan, with almost no discernible effects on health outcomes. It yielded answers to a host of additional sub-questions, including how utilization of different types of services by different types of people was impacted by the various cost-sharing arrangements (Newhouse et al., 1993).

Results from the RAND HIE had substantial effects on policy. There is some evidence that the study influenced many large corporations to make wider use of deductibles, co-payments and maximum dollar expenditure provisions starting in the early 80s. The HIE also appears to have influenced the federal government to permit nominal cost sharing in state Medicaid programs in 1982 (Newhouse, 1993). Finally, although no such policy changes have been made yet, the results of the HIE have strengthened the arguments for calls to reduce the tax subsidization of health insurance.

As the RAND HIE progressed, the theoretical analysis of the demand for health care underwent a double revolution. First, growing empirical evidence compelled many researchers to conclude that physicians influence the demand for their own services: the demand curve is endogenous; the principle of consumer sovereignty does not apply, or not completely. We will return to this development below, with reference to the market for physician services. The second revolution came in 1972, with the publication of Michael Grossman's "On the Concept of Health Capital and the Demand for Health" (Grossman, 1972).

Regarded by many health economists as one of the most original theoretical contributions in health economics to date, Grossman's paper applied an older economic concept, that of "human capital," to health. Medical care, Grossman argued, is desired not for its own sake, but as a factor contributing to health: the demand for medical care is thus derived both from the demand for health and from the production function for health. Health care, in this view, has no intrinsic consumption value.

Grossman's model has led directly to a substantial number of refinements and extensions: for example, the addition of uncertainty to the model (Phelps, 1976; Cropper, 1977); the determination of the optimal age profile for consumption of goods

hazardous to health (Ippolito, 1981). Muurinen (1982) offered a generalization of Grossman's model in which, in particular, she proposes to treat health care as both a consumption and an investment good. Grossman's model has also provided a theoretical basis for studying the effects of other factors than health care on health. If the demand for health care ultimately derives from the demand and production functions for health, then determinants of health other than health care become relevant to the economist's enterprise, even if on the face of it they seem to fall rather under the purview of other scientists.

Not that such a theoretical basis was really necessary: Fuchs, for example, had written on the effects of motor vehicle inspections on fatalities before that, in 1967 (Fuchs, 1967), and Auster, Leveson and Sarachek had estimated a health production function that considered the relative contributions to mortality of education, income, alcohol consumption, and other behavioral/environmental factors, as well as health care (Auster, Leveson and Sarachek, 1969). Furthermore, cost-benefit analysis needed no justification to be applied to health-related programs, such as syphilis control (Klarman, 1963). But Grossman's work did give added legitimacy to including rather un-economic determinants of health within the scope of health economics.

Grossman's model has contributed to empirical studies that have investigated, for example, the determinants of neo-natal mortality (Corman and Grossman, 1985) and the effects of maternal behavior on pregnancy outcomes (Resenzweig and Schultz, 1982). It has also been incorporated into a number of demand studies in developing countries (e.g., Gertler and van der Gaag, 1990).

## The market for hospital services

Much of the empirical research on hospitals has been concerned with hospital costs. It has sought to address, in particular, the following questions: (1) what factors account for differences in costs among hospitals at a given point in time? and (2), in particular, are there economies of scale in hospital production? Studies concerned with the causes of cost escalation will be reviewed in a subsequent section.

The second question is subsidiary to the first. In order to detect economies of scale, one has to show that, controlling for other factors, increasing hospital size is associated with decreasing average costs. Early studies had to contend with excessively aggregated output measures and inconsistent measurement methods (Lave, 1966).

The existence of slight economies of scale became apparent early on (Mann and Yett, 1968; Hefty, 1969). Over time an increasing number of explanatory factors also became apparent: differences in case mix (Feldstein, 1965); the number and specialty mix of physicians (Salkever, 1972; Davis, 1973); wage rates and the spread of unionization among hospital workers (Salkever, 1975, 1972; Adamache and Sloan, 1982); and the extent of competition among hospitals, with greater competition associated with higher costs (Robinson and Luft, 1985).

As Breyer (1987) has pointed out, estimation of hospital cost functions has proceeded mostly along two lines: there have been "ad hoc" studies, which regress some measure of unit cost against a list of intuitively reasonable predictors (e.g., Robinson and Luft, 1985); and "production theoretic" studies, which derive the functional form from the neoclassical theory of the firm (e.g., Cowing and Holtmann, 1983).

Whether "ad hoc" or "production-theoretic," cost function specifications are implicitly describing models of hospital behavior. Especially during the 1970s, several attempts were made to describe the behavior of hospitals using more or less formal models. Following Jacobs (1974), we can divide these models, with one recent exception, into two groups. The majority have treated the hospital as a unified organism, with one objective function or another; models in the smaller second group have attempted to represent the division of power between hospital administrators and physicians.

As most hospitals were not-for-profit institutions with ostensibly benevolent purposes, the utility function arguments most often considered in the first group of models were quantity and quality of care, either singly or in combination (Long, 1964; R. Rice, 1966; P. Feldstein, 1968; M. Brown, 1970; Newhouse, 1970a; M. Feldstein, 1971). Pauly and Redisch (1983) broke with that pattern when they proposed their "hospital as a physician's cooperative" model. They assumed "that the group of attending physicians on the hospital's staff enjoys de facto control of the hospital at any point in time" (p.88). In their model, "the hospital operates in such a way as to maximize the net income per member of the physician staff" (p.88). They were able at once to explicitly recognize an important institutional reality, and to represent it using a standard optimizing framework. The hospital was never again treated as a unitary organism.

Harris (1977), trained both as a physician and as an economist, took Pauly and Redisch's concern for descriptive accuracy one step further -- but with less concern to remain within the standard optimizing framework. In his informal model, the hospital is the scene of a tug-of-war between physicians (who seek to ensure the hospital has adequate excess capacity to meet their needs) and hospital administrators (who are also trying to keep costs down). From this Harris infers that attempts to control costs must target physicians. Although Harris' work has often been cited, only recently has there been any attempt to extend it (McClellan, 1994).

Pauly (1987) extended previous efforts to model not-for-profit hospitals in a new direction: he sought to determine what the effects of not-for-profit status are on hospital behavior. This led him to integrate a theory of donation (which seeks to explain the establishment of the not-for-profit hospital in the first place) with previous models focusing on the behavior of the hospital once established. Pauly argued that donations are made especially to not-for-profits, because they can more easily be trusted to maintain high quality of care. But this advantage disappears when the government starts to finance care, since there is no longer any need for

donations. For-profits can now move more quickly to areas where there is a profit to be made, because they can shift equity capital more easily. Ultimately, Pauly concludes, ownership status has little bearing on hospital behavior -- particularly since the ownership structure itself is a response to economic incentives.

Efforts to model hospitals during the past twenty years, therefore, appear to have gone in two different directions: Harris (1977) leads us to an intimate account of the activities inside a modern hospital, and their significance for the day-to-day process of decision-making within the hospital; Pauly (1987) tries to provide an explanation of the underlying economic forces that drive the formation of not-for-profit as well as for-profit hospitals themselves.

## The market for physician services

The first feature of the physician services market that attracted economists' attention was the anomalous prevalence of price discrimination in the presence of an inelastic demand curve. Economists offered in turn two general explanations for price discrimination. The first was that physicians acted as discriminating monopolists (Kessel, 1958; Newhouse, 1970b). Newhouse (1970b) in particular suggested that consumer ignorance gave physicians the opportunity to engage in price discrimination, and that physicians did so in a long-run, rather than short-run, profit-maximization perspective.

An alternative general explanation for price discrimination, however, involves charity toward lower-income patients. Subsequent models incorporated this motive (Ruffian and Leigh, 1973; Masson and Wu, 1974). In much the same way as Pauly and Redisch (1973) had done, these researchers found a way to adapt standard modeling tools to what they perceived as institutional reality (see Rochaix [1990] for a more complete review).

With the spread of insurance, however, the relation between physicians' charges and the payments they received began to weaken. Interest turned to the positive association between physician density and utilization per capita in Canada and some Western European countries, where fees are fixed, and between density and fees in the U.S. (Reinhardt, 1985).

Two schools of thought have emerged concerning these observations. The first has sought to explain them using neoclassical theory, invoking differences in demand exogenous to physicians' decisions (Sloan and Lorant, 1976, 1977; Pauly and Satterthwaite, 1981); the second has argued that physicians are able to induce demand for their own services and will do so when under financial pressure (Evans 1974; T. Rice and Labelle, 1989).

The issue has important policy implications. If physicians are able and willing to induce demand for their services, increasing the number of physicians or cutting their fees will result in increased utilization and, possibly, expenditures as well. In part because the issue has such large policy implications, it has attracted a great deal of attention.

Numerous empirical tests based on the associations between physician density and fees or utilization have been conducted (Fuchs, 1978; Wilinsky and Rossiter, 1981, 1983; Rossiter and Wilensky 1983; McCarthy, 1985; Cromwell and Mitchell, 1986). They have ultimately proven inconclusive, because of the impossibility of controlling in an entirely convincing way for differences in demand across areas (Feldman and Sloan, 1988; Rice and Labelle, 1989; Rochaix, 1990).

Another approach to testing for demand inducement is to examine physicians' responses to exogenous changes in their fees. Several such exogenous changes have been studied in the U.S.. The studies have suggested, rather more strongly than those using the first approach, the presence of demand inducement. None are entirely conclusive, again because of the impossibility of completely controlling for possible changes on the demand side (Holahan et al., 1979; Rice, 1983, 1984; Mitchell et al., 1989; Rochaix, 1990). What is interesting, however, is that different observers analyzing the same studies have persisted in drawing opposite conclusions from them: some, that any demand inducement that occurs is too small to threaten the validity of conventional supply-demand analysis (Feldman and Sloan, 1988, 1989); others, that the evidence for demand inducement is so strong that a new analytical framework needs to be devised (Evans, 1981; Rice and Labelle, 1989).

A recent study of particular interest focuses on the effects of cuts in Medicare fees for several procedures in 1988. Reaching for a new level of clinical detail, Yip (1993) has found that cuts in Medicare fees for Coronary Artery Bypass Grafts (CABGs) had three important effects: (1) an increase in CABGs on Medicare patients; (2) an increase in CABGs on non-Medicare patients; and (3) an increase in the average number of vessels grafted (the fee rises with the number of vessels). Her study is also significant for its use of private-payer as well as Medicare claims data.

Taken together, the empirical evidence suggests rather strongly that demand inducement does occur, and there are probably few health economists today who would entirely deny its existence. In spite of continued questions concerning its extent, policy-makers have been taking it into account in at least some instances. For example. the setting of the conversion factor for the Medicare Fee Schedule assumed that physicians who expected to lose income under the new payment system would recoup half their lost income through increases in utilization. Also, recent evidence of physicians making excessive referrals to diagnostic facilities in which they have a financial interest (Mitchell and Scott, 1992a, 1992b) has led some states to prohibit such financial arrangements. Whether supplier-induced demand justifies the replacement of conventional supply-demand analysis with a new theoretical framework, and if so what that framework ought to be, remains an unsettled issue (Evans, 1981).

## The escalation in health care costs

As health care costs have continued their inexorable rise in most developed

countries, and especially in the U.S., health economists have sought to explain the underlying causes of this escalation. Although one can find in the literature of the sixties many of the same general causes listed as are commonly invoked today, there has been a shift in relative emphasis and an increase in precision of understanding.

Early analyses of the market for hospital services sought to account for rapid increases in hospital costs. Some pointed to, among other factors, increases in the costs of specific inputs, including wages and facilities (Davis, 1974). M. Feldstein (1971) saw increases in input costs as resulting from an increase in demand, itself due to such factors as increases in insurance coverage, personal incomes, and the availability of hospital-oriented specialists.

Among the causes of increased demand, insurance came to be viewed as the major culprit. To quote Pauly (1986): "Indeed, it is not too much of an exaggeration to read many diagnoses of the reason for 'excessively' rising medical care costs as going back to a single cause -- the nature, amount, and form of health insurance" (p.630). Proposed palliatives focused on the tax subsidization of employment-based health insurance (Pauly, 1986).

As Newhouse (1992) has pointed out, however, given the price elasticity of demand implied by the RAND HIE, the actual reduction in the average coinsurance rate from 1950 to 1980 (67 to 27 percent) can account for only about one eighth of the five-fold increase in real expenditures per person during the period. Newhouse (1992) has estimated that aging, the spread of insurance, income growth, supplier -induced demand and differential productivity growth, together account for well under half of the rise in real health care expenditures. The remainder is most likely attributable, in his view, to technology.

But are technological advances exogenous or endogenous? Feldstein (1973), Newhouse (1978) and Russell (1979) suggested that higher levels of insurance could stimulate a too-rapid development of technology, which would in turn contribute to cost escalation. Goddeeris (1984a, 1984b) highlighted the endogeneity of the definition of health care -- and hence of insurable technologies -- under insurance contracts. Weisbrod (1991) developed these arguments, arguing that health insurance, by assuring a profitable market to developers of new medical technologies, has greatly contributed to the development of new technologies. Many of these technologies are "halfway technologies", which seek to contain or destroy the disease process: heart surgery, or chemotherapy. Such technologies are typically much more expensive than high (preventive) technologies such as vaccines, and they have become increasingly numerous, elaborate, and expensive.

Conversely, many of these halfway technologies, such as organ transplants, have increased both the mean and the variance of desired medical expenditures conditional on need. They then increase the demand for health insurance. Thus health insurance and technology development feed on each other to cause costs to spiral(Weisbrod, 1991).

Health economics and public policy: Setting prices for hospital and physician services

In the U.S., until the Medicare and Medicaid programs came into effect in 1966, the government's role in the health care sector was relatively limited. It was only some time after the inception of those programs that the mechanisms by which government intervention influences market outcomes began to be investigated. Due to space limitations we focus our attention on the development of pricing systems for hospitals and physicians.

Failure to control rising hospital costs led Congress to legislate the Prospective Payment System in 1983. Based on a methodology developed at Yale University (Mills, Fetter, Riedel and Averill, 1976; Fetter et al., 1980), the Diagnosis-Related Group (DRG) system changed Medicare's payment of hospitals from a retrospective to a prospective system. Under the DRG system, Medicare pays hospitals a fixed amount for each admission, based on diagnosis codes and procedures performed, with some adjustment for teaching hospitals.

Although development of the DRG system itself owes more to operations research than to economics, economists had discussed the effects of economic incentives on hospitals for some time. Hellinger (1979) had highlighted the need for exercising control on comprehensive measures of costs, to avoid cost-shifting; Lave, Lave and Silverman (1973), while finding that rate regulations in Western Pennsylvania had had little effect, discussed two potential incentive reimbursement systems, including one put forward by the American Hospital Association; Biles, Schramm and Atkinson (1980), using later data, reported evidence that state rate-setting programs could be effective. Although the evidence on the likely effectiveness of prospective payment as opposed to more market-based approaches remained mixed, these studies and others helped frame the debate that led to the passage of the 1983 legislation (Altman and Ostby, 1991). The legislation in turn provided much grist for subsequent economic analysis.

For example, Morrisey, Sloan and Valvona (1988) confirmed that, as expected, average length of stay for Medicare patients declined substantially following introduction of PPS. Russell and Manning (1989) concluded that PPS did succeed in reducing Medicare hospital expenditures substantially, while leading to only a small increase in out-of-hospital spending. Ginsburg and Carter (1986) found that 7 out of the 9.2 percentage points increase in the hospitals' case-mix index from 1983 to 1984 were due to hospital upcoding; but later Carter, Newhouse and Relles (1990) concluded that very little upcoding occurred between 1986 and 1987.

A similar story can be told concerning physician payment reform. From 1980 to 1988, Medicare outlays for physician services per enrollee grew at about 7 percent per year in real terms (Ginsburg and Lee, 1990). Physicians under Medicare had been paid under the complex Customary, Prevailing and Reasonable (CPR) system. This system, which was intended to protect physicians' ability to set their own fees, led to

severe inequities. Research pointed out that average fees for the same procedure could vary three or even four-fold across geographic areas -- much more than any differences in input costs or quality could account for (Burney, Schieber et al., 1978). Moreover, average relative fees for physician services bore little relation to time, effort, skill or resource cost requirements, with invasive procedures much more generously remunerated than visits (Hsiao and Stason, 1979). Based on these findings, Congress mandated the development of a Resource-Based Relative Value Scale (RBRVS)(Hsiao et al., 1988) and of geographic practice cost indices (Welch, Zuckerman, Pope and Henderson, 1989). Then, in 1989, it mandated that an RBRVS -based fee schedule be phased in between 1992 and 1996. The reform was accompanied by provisions to restrict balance billing by physicians, limit the growth in physician expenditures using expenditure targets, and fund the development of practice guidelines.

Thus studies that had a very large impact on policy (particularly those that actually produced the DRG and RBRVS systems) were not, at their core, economic studies. They involved statistical, rather than econometric, data analyses, and were not designed to test hypotheses derived from formal economic models. But their adoption for use as policy instruments was motivated in an important way by economic arguments concerning provider incentives. Although some have argued that descriptive studies have the larger influence on policy (I.,Brown, 1991), such studies are initiated and interpreted on the basis of a theoretical framework heavily influenced by the work of health economists.

## NORMATIVE EVALUATION

Normative evaluation in health care, as in other fields of activity, is made according to two criteria: efficiency and equity. Although there can exist a trade-off between the two, they have been for the most part treated separately in the literature.

### Efficiency

Arrow's 1963 paper, "Uncertainty and the Welfare Economics of Medical Care," was the first to subject the health care sector to a rigorous welfare analysis. Arrow's argument can be summarized simply: (1) uncertainty and the impossibility of creating complete markets for risk-bearing influence the nature of available health insurance as well as other characteristics of the health care sector, such as licensure of physicians and the ethical imperatives to which they are bound; (2) these characteristics in turn prevent the market from becoming more competitive, and hence, from moving toward Pareto-optimality. This then justifies the government, Arrow argued, in providing insurance where the market failed to do so.

Commenting on Arrow's paper, Lees and Rice (1965) suggested that transactions

and selling costs in fact accounted for the incompleteness of insurance markets. Government-funded provision of insurance may then not be optimal. Arrow (1965) replied, in essence, that transactions and selling costs became largely irrelevant under compulsory government provision of insurance. Pauly (1968) offered a more compelling reason for doubting that the government should undertake to insure consumers against all health care risks: moral hazard. Since insurance reduces the cost of medical care, and since the quantity of medical care consumed is determined at least in part by the consumer, insurance tends to lead to excessive consumption.

Pauly's argument implied a trade-off between the risk-bearing benefit of insurance, and the cost of excess medical care consumption due to overinsurance. In a classic paper, M. Feldstein (1973) estimated that, on net, raising the average coinsurance rate from 0.33 to 0.67 would result in net welfare gains in the private hospital sector greater than $27.8 billion (in 1984 prices). Feldstein, however, had to rely on relatively crude estimates of the price elasticity of demand and of the degree of risk aversion among consumers. Results from the RAND Health Insurance Experiment (Manning et al., 1987, 1988) allowed Feldman and Dowd (1991) to estimate that the net welfare loss, given the trade-off between risk bearing and excess consumption, was between $33.4 and $109.3 billion in 1984.

The theoretical basis for such analyses has, however, recently come under question. Feldman and Dowd assume, as conventional welfare analysis does, that the demand curve can be used to estimate consumer welfare. Phelps and Parente (1990) and T. Rice (1992) have proposed that appropriateness of care should instead provide the basis for measuring consumer welfare. The underlying argument, once again, is rooted in uncertainty: as Weisbrod (1978) has pointed out, consumers often have no way of knowing how much they will gain from care they are about to receive, or even how much they have gained from care already received. Their lack of information, which allows physicians to influence the care they are willing to purchase, also casts into doubt the validity of their valuations (T. Rice, 1992).

Pauly's (1968) moral hazard argument also led in another direction. If moral hazard leads to excess health care consumption, then reducing the completeness of coverage by means of deductibles and coinsurance might actually increase welfare. But what about the impact on the poor? A possible increase in efficiency might be unjustifiable if it compromised equity. This brings us to a brief review of developments in the analysis of equity.

## Equity

Consideration of distributional issues in health care has been motivated, first of all, by the presence of distributional externalities (Lindsay, 1969; Culyer, 1971; Pauly 1971). There is a virtual consensus today that such externalities justify the subsidization of health care to the poor (Pauly, 1986). Rather than rely on individual consumer valuations of equity, others have proposed that health care be viewed as a

merit good: the judgment that subsidization is justified then passes to the social planner. The thorny problem implied by the choice between these two justifications can be avoided by invoking morality as the grounds for subsidizing health care for the poor (Sen, 1977; see Culyer [1981] for a review).

One strand of the subsequent literature has sought to define more precisely what is meant by equity. Mooney (1983, 1986) and Le Grand (1982, 1987, 1991) have identified several possible definitions, including for example "equality of access" and "equality of health." Culyer and Wagstaff (1993b) have further shown that these definitions are incompatible with each other. A second strand has aimed to evaluate the equity of health care systems as a whole, including cross-national comparisons (van Doorslaer et al., 1993).

## CONCLUSIONS

Health economics has made substantial strides in the depth and precision of its understanding of the working of the health care sector, in its ability to predict the effects of policy interventions on costs, access and even health outcomes, as well as in its development of tools for the evaluation of particular policies and health care systems. The development of QALYs, in spite of their limitations, has marked a real advance over cost-benefit and simple cost-effectiveness analysis.

The RAND Health Insurance Experiment has led to surprising progress in understanding the demand side, as well as some important aspects of the supply side. We now have remarkably solid estimates of the effects of changing individual co-insurance provisions on health care expenditures, utilization by type of service, and health outcomes. Furthermore, we can distinguish between effects on the poor as well as the non-poor. The RAND HIE has also confirmed theoretical predictions that pre-paid group practice leads to lower utilization than fee-for-service care.

On the supply side, theoretical and empirical analysis of physician behavior has highlighted the need to take into account physicians' ability to induce demand for their services when they are under economic pressure (although the magnitude and precise character of such responses remain in doubt). Our theoretical and practical understanding of how hospitals work has increased, allowing some measure of confidence in predicting the effects of further changes in hospital payment methods. The way in which insurance coverage and technological development interact to fuel the escalation of health care costs is being described in growing detail.

We do not yet, however, have compelling theoretical models of physician, hospital or insurer behavior. The inherent complexity of the health care delivery system, its rapid evolution, and the difficulty of obtaining detailed data on hospital and physician behavior, have slowed progress on the supply side. The disparity in understanding between the demand and supply sides is evident in the design of recent U.S. health care reform simulation models. All of these have been able to represent

consumer behavior in much greater detail, and with much greater confidence, than the behavior of physicians, hospitals and insurers (Hsiao et al., 1993).

The evolution of health economics reflects the evolution of policy concerns. The initiation of the RAND HIE, the development of DRGs and of the RBRVS, all were stimulated by policy-makers' needs. That this would be so is hardly surprising, in a context where most research is funded on a project-by-project basis by federal or state governments, or by policy-oriented private foundations.

Yet even with such a strong policy focus theoretical controversy has emerged: in the measurement of health states, in the modeling of physician behavior, in welfare analysis. Underlying all these tensions are different degrees of commitment to the neoclassical framework. Evans (1981), Phelps and Parente (1990) and Rice (1992) have begun to develop alternative theoretical frameworks. If Kuhn (1970) is right, only when a more complete and compelling alternative to the neoclassical framework (a new paradigm) emerges is the neoclassical framework likely to be abandoned.

More extensive and detailed empirical analysis than has been done until now may help such an alternative to emerge. As Phelps (1992) has pointed out, early work in health economics relied on aggregate data, such as state-level mortality rates. Further advances called for the collection and analysis of finer data, such as household surveys of medical expenditures, and the data collected for the RAND Health Insurance Experiment. The frontier health economics has now reached involves the collection of clinically detailed data. As noted above, Yip (1993), for example, has looked for (and found) evidence of demand inducement by examining changes in the volumes and proportions of one to six-vessel coronary artery bypass graft operations following reductions in fees for these procedures. The accumulation of such studies may well lead, through an inductive process, to the formulation of a richer and more useful theoretical framework. It may also, in so doing, allow questions to emerge that the current neoclassical framework obscures (Evans, 1981).

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