Effects of Mental Health Insurance

Evidence from the Health Insurance Experiment

Willard G. Manning, Jr., Kenneth B. Wells, Joan L. Buchanan, Emmett B. Keeler, R. Burciaga Valdez, Joseph P. Newhouse
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October 1989

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RAND
PREFACE

This report provides an overview of the effects of variations in generosity of fee-for-service insurance on mental health outcomes, use of outpatient mental health services, and the risk to families associated with unanticipated use of mental health services. The work uses data from the RAND Health Insurance Experiment. Other RAND reports and papers that deal with the effects of fee-for-service insurance include:


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SUMMARY

Using data from The RAND Health Insurance Experiment, we examined the effect of mental health insurance on individuals' mental health outcomes, use of mental health services, and economic welfare. Variation in cost sharing induced no significant change over time in mental health status averaged over all beneficiaries. However, there were interactions among plan, initial mental health status, and income. Those with initially good mental health status who were poor had better outcomes under cost sharing than under free care. Those who initially had poor mental health status had a relatively more favorable response to free care, but we did not have the precision to determine whether they were absolutely better off under free care.

Because there was no adverse effect on mental health outcomes for the average person, we turned our attention to the tradeoffs between moral hazard and risk avoidance—that is, the tradeoff between the loss from overconsumption of mental health care because it is insured and the gain from reducing families' financial risks that stem from unanticipated use of mental health services. The demand for outpatient mental health services was more responsive to insurance generosity than was the demand for outpatient medical services. This difference was partially offset by the reduction in financial risks that health insurance provides to families. Our results suggest that for an individual or family, the optimal coinsurance rate for outpatient mental health services is between 25 and 50 percent with a $1,000 ceiling annually on out-of-pocket payments for individuals or $2,000 per family for all health services (1986 dollars) subject to an annual limit of 52 covered outpatient mental health visits.
ACKNOWLEDGMENTS

We would like to thank Elizabeth McGlynn and Naihua Duan at RAND for their suggestions; Bernadette Benjamin, also of RAND, for her meticulous programming and data management; and Paul Widem (National Institute of Mental Health), and Thomas Kickham (Health Care Financing Administration) for their support. Neither The RAND Corporation, nor any of the above-named people necessarily agree with or endorse the findings reported here.

We dedicate this report to the memory of Carl Taube (formerly of Johns Hopkins and NIMH) who, in addition to being a good friend and valued colleague, urged us to synthesize and expand our work and helped to secure funding for its completion.
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I. INTRODUCTION

Many private insurance carriers have recently reduced coverage of mental health services, and reductions have been considered for Medicaid (Pardes and Pincus, 1983). Although these reductions are designed to reduce insurers' costs that relate to service use, the broader implications of such changes for the economic welfare of beneficiaries is uncertain. What should be the level of consumer cost sharing for mental health services? Concern about limited coverage for mental health services has led some states to mandate the inclusion of mental health benefits in health insurance policies (Stoddard et al., 1983). How much should society support the inclusion of mental health services in health insurance?

To address these mental health insurance questions, data are needed on the impact of variations in cost sharing on the following outcomes:

- The mental health status of the population, especially those who are ill. If a reduction in cost sharing increases the use of needed and effective health services, it should increase health and well-being. However, increases in the use of inappropriate care could have the opposite effect.
- Access to mental health care and the amount of mental health care purchased. In the United States and other countries, more generous health insurance has been used as a policy instrument to increase use of health services by needy populations—the sick, the poor (Medicaid), and the elderly (Medicare)—by removing or reducing financial barriers to care. However, lower cost sharing also generates losses to society because of the overuse of health services that results when patients (and others affected by the patient's use of these services) value the additional services at less than it costs society to produce them.
- The financial risk to the family from uncertainty about expenditures for mental health care. By reducing the financial uncertainty associated with health bills, insurance improves the well-being of consumers.
- The financial burden of large mental health expenses (whether or not those expenses are predictable). Even if society knew with certainty which persons would use mental health services (and protection from financial risk were not an issue), it might choose to use insurance to reduce the financial burden faced by
some families by spreading the costs of these services over the covered population.

Evidence on the effects of health insurance on these outcomes has been limited, at best. The effect of insurance on the demand for mental health care is the only one of these topics that has been extensively studied.\(^1\) The existing estimates for the price response for mental health care span a broad range. In particular, there is disagreement about the difference in price response between outpatient mental health and outpatient medical care. The magnitude of the difference is important because the more price responsive demand is for mental health care, the less generous should be its insurance coverage relative to medical care, other factors equal. For a discussion of these issues, see Keeler et al. (1988) and Besley (1988).

Such disagreement is not surprising in the light of the statistical problems of using nonexperimental data to estimate the effect of out-of-pocket price on the demand for health care. In nonexperimental studies, insurance coverage may be self-selected. Those who expect to demand more mental health services have a strong financial incentive to obtain more complete mental health coverage, either by selecting an employer with more generous coverage, or by choosing a more generous insurance package at work, if a choice is available. The result is a biased estimate of the response to variations in health insurance—a bias that overstates the response to health insurance. The more generous insurance plans are observed to have higher use because their covered population is sicker, and also because of the increase in use induced by more generous health insurance. Indeed, this bias in the estimate of the effect of insurance on the demand for services may be more important for outpatient mental health services than for medical services.\(^2\)

Although several studies have examined the effects of variation in cost sharing on use of mental health services, estimates of its effects on mental health status were not available until the recent publication of results from the Health Insurance Experiment (HIE).\(^3\)

Little is known about the effect of insurance on the financial risk and burden of large bills for mental health care, because few studies have sufficiently detailed data on the insurance policy to generate this information.


\(^2\)This bias is exacerbated by the common practice of using the ratio of out-of-pocket to total expenses as a price measure (Newhouse, Phelps, and Marquis, 1980), rather than consistent estimation techniques, such as instrumental variables in an episodic model (Keeler et al., 1977, 1982, 1986, 1988), or Ellis's (1986) expected price approach.

\(^3\)Brook et al. (1983, 1984), Valdez et al. (1985), Valdez (1986), and Wells et al. (1989).
Given the uncertainty in estimates of the effects of health insurance on the use of services in general, the absence of estimates of the effect of insurance on health status, and the importance of consistent and reliable estimates for public policy, the federal government initiated a randomized trial, the RAND Health Insurance Experiment, to assess the effects of varying cost sharing on the use of health services and health status (Newhouse, 1974). The HIE is unique among studies of health insurance because it used randomization to avoid the problem of adverse selection.

In this report we provide an overview of the effects of variations in insurance generosity on mental health status and the use of mental health care, based on data from the HIE. First, we review the effects of different insurance plans on mental health outcomes. Second, we review the effect of out-of-pocket price on the demand for outpatient mental health care. Then, using results from Keeler et al. (1986) we examine the effect of cost sharing on the financial risk and burden to families stemming from use of mental health services. With these estimates of financial risk, we examine the tradeoff between the losses from moral hazard resulting from overconsumption of services and the gains from reducing financial risk. We conclude with a discussion of optimal insurance coverage for outpatient mental health care.
II. DATA AND STATISTICAL METHODS

THE DESIGN OF THE HEALTH INSURANCE EXPERIMENT

The HIE is a randomized trial designed to study the effects of health insurance generosity on the demand for health services and the health status of individuals.¹

Between November 1974 and February 1977, the HIE enrolled families in six sites: Dayton, Ohio; Seattle, Washington; Fitchburg, Massachusetts; Franklin County, Massachusetts; Charleston, South Carolina; and Georgetown County, South Carolina. In each site, the study enrolled families for either three or five years.

Insurance Plans

Families participating in the experiment were assigned to one of 14 fee-for-service (FFS) insurance plans and a prepaid group practice. In this report, we used data from the fee-for-service part of the HIE. In referring to dollar limits (on out-of-pocket costs and on covered expenses) in the HIE plans, we use the value of dollars at the time of the experiment; the limits were not changed over the course of the HIE. The HIE insurance plans varied cost sharing along two dimensions—the coinsurance rate and the upper limit on out-of-pocket expenses. The coinsurance rates (percentage paid out-of-pocket by the patient) were 0, 25, 50, or 95 percent for all health services. Each coinsurance plan had an upper limit (the maximum dollar expenditure or MDE) on annual out-of-pocket expenses of 5, 10, or 15 percent of family income, up to a maximum of $1,000. Beyond the MDE, the insurance plan reimbursed all health expenses in full for the remainder of the accounting year. One plan had different coinsurance rates for medical services (25 percent) than for dental and outpatient mental health services (50 percent).² Finally, on one plan, the families faced a 95 percent coinsurance rate for outpatient services, subject to a $150 annual limit on out-of-pocket expenses per person (or $450 per family). In this plan, all inpatient services were free; in effect, this plan had an

¹See Newhouse (1974), Newhouse et al. (1981), Brook et al. (1983, 1984), and Valdez (1986) for fuller descriptions of the design.

²Inpatient psychiatric services had the same coinsurance rate as inpatient medical services on all plans.
outpatient individual deductible. Table 1 summarizes the fee-for-service plan characteristics.

A simple example illustrates how an HIE plan worked. Consider a family facing a 25 percent coinsurance rate for all health services and an upper limit on out-of-pocket expenses of $1,000. For the first $4,000 of expenditures for any health service (dental, medical, or mental health), the family paid 25 percent of the bill and the insurance company paid 75 percent. Beyond that point, the family paid nothing more out-of-pocket that year, because it had already paid the $1,000 upper limit on out-of-pocket expenditures (= 0.25 × $4,000). At the beginning of the new accounting year, the family again paid 25 percent of the bill, until it reached its annual upper limit on out-of-pocket expenses.

All plans covered the same services. These included psychiatric

Table 1

<table>
<thead>
<tr>
<th>Plan</th>
<th>Medical Coinsurance Rate (%)</th>
<th>Mental Health Coinsurance Rate (%)</th>
<th>Annual Upper Limit on Out-of-Pocket Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Family cost-sharing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25/25</td>
<td>25</td>
<td>25</td>
<td>5, 10, or 15% of income, up to $1,000</td>
</tr>
<tr>
<td>25/50</td>
<td>25</td>
<td>50</td>
<td>5, 10, or 15% of income, up to $1,000</td>
</tr>
<tr>
<td>50/50</td>
<td>50</td>
<td>50</td>
<td>5, 10, or 15% of income, up to $1,000</td>
</tr>
<tr>
<td>95/95</td>
<td>95</td>
<td>95</td>
<td>5, 10, or 15% of income, up to $1,000</td>
</tr>
<tr>
<td>Individual</td>
<td>95 ambulatory</td>
<td>95 ambulatory</td>
<td>$150/person or $450/family</td>
</tr>
<tr>
<td></td>
<td>deductible</td>
<td>0 inpatient</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 inpatient</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Insurance plans covered the first 52 psychotherapy visits per person per year. Dollars at the time of the experiment.

3If the coinsurance rate for the plan with individual limits were 100 percent, rather than 95 percent, then it would be exactly a deductible plan.

4See Clasquin (1973) for a discussion of the HIE benefit structure. Nonpreventive orthodontia and cosmetic surgery (not related to preexisting conditions) were not covered. Also excluded were outpatient psychotherapy services in excess of 52 visits per year per person. In the case of each exclusion, it is questionable whether anything could have been learned about steady-state demand during the three- to five-year lifetime of the experiment.
inpatient care and up to 52 outpatient psychotherapy visits per year per person delivered by any physician, psychologist, psychiatric social worker, nurse, or other licensed therapist.

Sample Selection and Assignment

Families were assigned to plans using the Finite Selection Model (Morris, 1979). This model was designed to achieve as much balance across plans as possible while retaining randomization. That is, it reduced correlation of the plans with health, demographic, and economic covariates.

Families were enrolled as a unit with only eligible members participating. No choice of plan was offered; the family could either accept the offered experimental plan or choose not to participate. To minimize refusals, families were given a lump-sum payment greater than the worst-case loss that would occur under the assigned HIE plan relative to their previous, non-HIE plan; thus, families were always better off financially for accepting the enrollment offer. Moreover, because of a bonus for completion, they were always better off completing the study. Hence, there is a theoretical presumption of no bias from refusal or attrition. In fact, we have detected negligible effects from refusal and attrition (Brook et al., 1983, 1984; O'Grady et al., 1985; Newhouse et al., 1987).

The family's prior non-HIE insurance plan was maintained for the family by the HIE during the experiment, with the benefits of the policy assigned to the HIE. If the family was uninsured, the HIE purchased a policy on its behalf. Thus, no family could become uninsured as a result of participation in the study.

Threats to Validity

To allow valid unbiased plan comparisons, the HIE design featured randomization of families to insurance plans. Despite randomization, there remain two potential threats to the balance of health and other characteristics across the insurance plans: nonrandom refusal of the offer to participate, and nonrandom attrition from the study. If the refusers (or attritors) were sicker on average, and if there were more refusers in the family cost-sharing plans, then our analysis of plan effects would be based on enrolled populations that were no longer comparable. The family cost-sharing plans would appear to be less expensive than they actually were, because the average person on these plans would be healthier than the average person on the free care plan. To address these potential threats we evaluated the degree of bias resulting from refusals to participate and from attrition.
Refusals of the plan offer varied from 6 percent on the free plan to 23 percent on the 95 percent coinsurance plans in the non-Dayton sites (see Brook et al., 1984). Analysis of these refusals to participate indicated that the only significant differences between those who accepted and those who rejected the offer were that the latter had lower education and income. Income and education are both controlled for in the analyses presented here. There was no evidence that those who rejected the offer to participate were sicker, or that there was an interaction between plan, sickness, and refusal of the offer.

If the refusal of plan were random with respect to mental health status, we would expect to find no significant differences in entry values for our three measures of mental health status—the overall mental health status, psychological distress, and psychological well-being measures, which are described below. There was no evidence of plan bias based on the global mental health status measure or the psychological distress subcomponent. However, psychological well-being was significantly different (p < 0.05, unadjusted for multiple comparisons) for enrollees in the free plan compared to the individual deductible plan, with the average enrollee on the individual deductible plan scoring lower at the beginning of the study. This psychological well-being result is the opposite sign from what we expected a priori from a plan refusal related to mental health status. Our expectation was that those with initially poor mental health status would be more likely to refuse a less generous plan than if offered a more generous plan (such as the free plan): This would tend to make participants in the high refusal plans, such as the family cost sharing and individual deductible plans, healthier on average. We observed the opposite for psychological well-being.

Individuals on the family cost-sharing and individual deductible plans were more likely to leave the study early than were individuals on the free plan. Those departing early were sicker on average than those who stayed. The dropouts had initial mental health status scores that were lower (i.e., they were sicker) than stayers by an amount one-third larger than the drop in mental health status associated with being fired or laid off (p < 0.01).

Despite the magnitude of the difference between dropouts and stayers overall, the only significant and systematic difference in mental

---

5 Data from Dayton are incomplete and hence have not been analyzed, but the refusal of the enrollment offer across all plans in Dayton was only 7 percent. Additionally, we have compared the group that enrolled on all plans with the group that completed baseline interviews but did not enroll. The only significant difference was that children are overrepresented by a modest amount in the group that enrolled (Morris, 1985). No significant preexperimental differences were found for self-reported utilization and health status (Morris, 1985). Age is explicitly controlled for in our analysis.
health status by insurance plan was for overall mental health status, where the individual deductible dropouts were sicker on average than dropouts on other plans.

The net effect of refusal and attrition on mental health status was that the plans were not significantly imbalanced at enrollment for those who stayed until the end of the study. Although psychological well-being was not balanced at enrollment for the whole sample, it was balanced across plans at enrollment for those who normally completed the study.

Nevertheless, to reduce potential refusal and attrition bias, we included measures of initial mental and physical health status as covariates. We also tested directly whether the dropouts had a different response to insurance plan than the stayers.

THE SAMPLE

The sample was a random sample of each site's population, but the following groups were not eligible: (1) those 62 years of age and older at the time of enrollment; (2) those with incomes in excess of $25,000 in 1973 dollars (or $61,000 in 1985 dollars—this excluded 3 percent of the families contacted); (3) those eligible for the Medicare disability program; (4) those in jails or institutionalized for indefinite periods; (5) those in the military or their dependents; and (6) veterans with service-connected disabilities. Table 2 gives the enrollment sample size for each plan.

The mental health outcome results reported here are based on 14,900 person-years of data for enrollees age five or older at enrollment who completed (or whose parents completed) the appropriate mental health questionnaires; data on mental health status for children under five were not collected.

The mental health expenditure results are based on 16,429 person-years of data from the first three years for each site; see Keeler et al. (1986) for further details.\(^6\) This sample constitutes over 80 percent of the available sample, and there is little reason to expect any appreciable bias from working with it.

\(^6\)The last three years for the South Carolina group that was enrolled for five years.
Table 2

ENROLLMENT SAMPLE

<table>
<thead>
<tr>
<th>Insurance Plan</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>1,893</td>
</tr>
<tr>
<td>Family cost-sharing</td>
<td></td>
</tr>
<tr>
<td>25 percent</td>
<td>1,137</td>
</tr>
<tr>
<td>50 percent</td>
<td>383</td>
</tr>
<tr>
<td>95 percent</td>
<td>1,120</td>
</tr>
<tr>
<td>Individual deductible</td>
<td>1,276</td>
</tr>
<tr>
<td>Total</td>
<td>5,809</td>
</tr>
</tbody>
</table>

NOTE: Plans grouped by mental health coinsurance rates.

MENTAL HEALTH OUTCOMES

Mental Health Status

The Mental Health Inventory (MHI) was designed specifically to measure mental health status in the HIE. The adult version was based on 38 self-administered items that were positively scored on a 0 to 100 scale. The MHI was adapted from the General Well-Being Schedule (Dupuy, 1974) and other measures (Costello and Comrey, 1967; Dohrenwend et al., 1980; Beck, 1967). A similar measure was developed for children aged 5 to 13, based on 12 questionnaire items (Eisen et al., 1980). The item content for the adult battery is summarized in Table 3.

The MHI evaluates psychological constructs but does not assess physical and psychosomatic symptoms. It includes items measuring the frequency and intensity of symptoms of both psychological distress (e.g., anxiety and depression) and psychological well-being.

The MHI has a factor structure that is generalizable across the HIE sites (Veit and Ware, 1983). This structure is characterized by higher-level bipolar factors for psychological distress and psychological well-being. Psychological distress (PSDS) and psychological well-being (PWB) are represented by scales, which combine to form the total MHI score. For the adults, five subscales represent the dimensions within psychological distress (anxiety, depression, loss of behavioral or emotional control) and psychological well-being (general positive affect...
Table 3
SUBSCALE ITEM CONTENT OF MENTAL HEALTH INVENTORY
(Adult version)

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very nervous person</td>
<td>Moody, brooded about things</td>
</tr>
<tr>
<td>Bothered by nervousness</td>
<td>Low or very low spirits</td>
</tr>
<tr>
<td>Felt tense or high-strung</td>
<td>Felt downhearted and blue</td>
</tr>
<tr>
<td>Anxious, worried</td>
<td>Felt depressed</td>
</tr>
<tr>
<td>Difficulty trying to calm down</td>
<td>Strain, stress, pressure</td>
</tr>
<tr>
<td>Nervous or jumpy</td>
<td></td>
</tr>
<tr>
<td>Restless, fidgety, impatient</td>
<td></td>
</tr>
<tr>
<td>Rattled, upset, flustered</td>
<td></td>
</tr>
<tr>
<td>Hands shake when doing things</td>
<td></td>
</tr>
<tr>
<td>Relax without difficulty</td>
<td></td>
</tr>
</tbody>
</table>

**Loss of Behavioral/Emotional Control**
- Control behavior, thoughts, feelings
- Concern about losing control of mind
- Felt emotionally stable
- Nothing turns out as wanted
- Felt like crying
- Better off if dead
- Down in the dumps
- Think about taking own life
- Nothing to look forward to

**General Positive Affect**
- Happy person
- Happy, satisfied or pleased
- Daily life interesting
- Felt calm and peaceful
- Felt cheerful, lighthearted
- Generally enjoyed things
- Relaxed and free of tension
- Living a wonderful adventure
- Expected an interesting day
- Wake up fresh, rested
- Future hopeful, promising

**Emotional Ties**
- Felt loved and wanted
- Love relations full, complete
- Felt lonely

NOTE: All items in this table are positively scored.
and emotional ties). For children, these subscales capture information on distress (anxiety and depression) and well-being (positive affect). Each scale is scored on a scale of 0 to 100. For MHI, a higher score indicates better mental health.

The MHI is highly reliable in a general population, as measured by a Cronbach's alpha (1951) of 0.96 for the HIE population. The internal consistency reliability estimates for MHI and its two major sub-scales range from 0.92 to 0.96—levels of reliability appropriate for comparisons of individuals. Stability coefficients range from 0.64 to 0.69 for the MHI. These coefficients can be interpreted as the proportion of true score variance that remains unchanged over a year.

The MHI has excellent construct validity (Veit and Ware, 1983; Ware et al., 1980b; Williams et al., 1981). The MHI is sensitive to the impact of stressful events and to social support. The total MHI score strongly predicts the use of outpatient mental health services. For example, the subsample in the bottom third of the MHI (total score) uses nearly three times as much outpatient mental health services as the upper third (Wells et al., 1982; Ware et al., 1984).

Use of Mental Health Services

Claims provided the data on mental health expenditures. We defined as outpatient mental health care any visit that included a mental health procedure (according to the California Relative Value Scale). These included psychotherapy, shock therapy, psychological testing, and other counseling services. We also included initial visits to mental health specialists with a deferred diagnosis. We did not include visits or expenditures on mental health care from general medical providers. Although half the population received mental health care from general medical providers, nearly 95 percent of the mental health expenses were for psychotherapy services from mental health specialists (Wells et al., 1982).

Financial Risk and Burden

Our measure of the risk to the family of large bills for mental health care was based on the variance in out-of-pocket expenditures across families. Ideally, one would prefer to use each family's preference about uncertainty to estimate the risk premium that it would be willing to pay to eliminate uncertainty—that is, the amount that they would be willing to pay to have the same expected level of mental health expenses with certainty, rather than the "gamble" of no expense with probability p and various levels of care with probabilities that sum to 1 − p. Unfortunately, this information was not directly available.
STATISTICAL METHODS

Estimating Insurance Effects on Mental Health Status

For estimating the effect of insurance plan on change in each of the mental health status measures, we used both analysis of variance (ANOVA) and multiple regression methods.7 The dependent variable in the regression is the difference between each year's value of mental health status and the entry value. Therefore, our comparisons are of the before-and-after variety.8 In the multiple regression methods, we also included the entry value of mental health status as a covariate.

By using differences, we allowed each individual to act as his own control. If some individuals have a stable tendency to have higher or lower outcomes, differencing will remove this effect. This approach led to more precise estimates than if we had simply regressed mental health status at the end of each year on insurance plan, income, and other covariates. Differencing also had the advantage that it largely purged the results of any residual imbalance among the plans that existed after randomization, such as might have occurred from refusal of the initial offer or subsequent attrition from the study.

All differences reported here are stated in terms of annual changes, whether they occurred during the first or last year of the period examined. We adjusted for the amount of time elapsed between each year's and the entry measurements; each difference was divided by the amount of time from the beginning of the study to the time of assessment.

The data exhibit a heteroscedastic response as a result of stating all differences in annual terms. Observations averaged over a five-year period are less variable than those averaged over a one-year period. As a result, we weighted all observations to reflect time at risk.

7It was not possible to separate the effects of the coinsurance rate and the upper limit on out-of-pocket expenditures in our analysis of the effect of insurance on mental health status. Instead we largely focused on the overall effect of plan on mental health status. We did examine the effect of the expected coinsurance rate, using a method similar to that developed by Ellis (1986). We replaced the coinsurance rate by the expected coinsurance rate, allowing for the probability that the family will exceed the MDE. As Wells et al. (1989a, 1989b) report, we obtained the same qualitative pattern of results, but the estimates were less precise.

8An alternative method is to look directly at annual increments, that is MHI(t) - MHI(t-1), rather than MHI(t) - MHI(entry). We rejected this approach for two reasons. First, to maintain comparability with Brook et al. (1984) and Valdez (1986) it was necessary to use differences from the enrollment year. Second, the annual increment approach generates an error term that has a moving average structure. With an unequal number of years per person, efficient estimation would have required new and much more expensive software. Fortunately, existing software allowed us to use the year-minus-entry-value approach.
Our data exhibit positive correlations among individuals in the same family, and among observations for the same individual over time. Using differences (response at time t minus response at time 0) removes most but not all of the correlation.\footnote{In fact, differencing adds some correlation. Each year’s response includes a permanent and transitory component. Differencing removes the permanent component but adds the (negative of the) entry transitory term to each subsequent error for differences. As a result, we observe a positive correlation among differences.} We modeled this correlation using a nested variance component or intraclass cluster model (Maddala, 1971; Searle, 1971).

Our primary independent variables include indicators for the mental health plans as well as initial (baseline) mental health status measures. To increase our precision, we included family income and size, site, age, sex, race, education, general health perceptions, and physical limitations.\footnote{For a fuller discussion of the mental health status estimation methods and results, see Wells, Manning, and Valdez (1989a, 1989b).}

**Estimating Insurance Effects on Mental Health Use**

The family’s demand for services in response to the HIE insurance plan was an amalgam of responses to the coinsurance rate below the upper limit on out-of-pocket expenses, and free care beyond the limit. To separate the effects of coinsurance from those of upper limits on mental health expenditures, we used the episodic model developed and modified by Keeler et al. (1977, 1982, 1986). Using the period when the families still faced a large remaining out-of-pocket expense (MDE) as an approximation of a pure coinsurance plan, we estimated the effect of coinsurance on the probability of beginning treatment and the intensity of use (once in treatment); see Keeler et al. (1986) for details.

**FINANCIAL RISK ESTIMATE METHODS**

One benefit of insurance is protection against the risk of financial loss related to unanticipated use of mental health care. This is distinct from the issue of actual financial loss or burden which is discussed below. We estimated this value using expected utility. Because we did not observe preferences about risk directly, we made several assumptions that allowed us to use expected utility theory to approximate an estimate of risk aversion. First, we assumed that families evaluated risks in terms of the mean and variance of out-of-pocket payments.
This assumption is plausible because the variance is closely related to most people's concept of risk.\textsuperscript{11}

Second, we made no direct adjustment for income; the argument in the expected utility function should be income minus insurance premium minus out-of-pocket costs. However, if the size of the loss is not correlated with income, we can ignore the term for the variance in income that should be in the approximation below. That is, the income term will cancel from all comparisons of alternative plans. By using a utility function that exhibits constant absolute risk aversion, we ignored the role of family income in the differential ability or willingness to bear financial risk. In particular, we did not adjust for the fact that a risk of a $1,000 is a much larger risk for a poor family than a rich family.

Finally, we relied on a second order Taylor's series expansion of the utility function. If $x$ represents the amount spent on health insurance premiums and out-of-pocket spending for coinsurance and deductibles, then the expected utility of that spending can be approximated by $E(U) = E(x) - [r \text{Var}(x)]/2$. The approximation to the risk premium is $(r/2)$ times the variance of out-of-pocket expenses (Pratt, 1964), where $r$ is Pratt's constant absolute risk aversion parameter.

For computational tractability, our calculation of the risk premium was based upon the total variance in out-of-pocket spending. In theory, families may face less uncertainty about their spending. One could argue that the risk premium should be based on an average across families of the family-specific variances. Because the total variance equals the sum of the expected value of the variance within family plus the variance across families, our estimates could overstate risk by the proportion of: (across family variance/total variance). The significance of this observation depends upon how well a given family can predict its out-of-pocket expenses for mental health services. If the variance across families is small relative to the family-specific variance, then our approximate estimate and the theoretically correct estimate are comparable.

If one makes the plausible assumption that families can predict fairly well whether they fall into the spending or nonspending category in a given year, but cannot predict expenses well beyond this level, then because most families are nonspenders the variance across families will be small and the two estimates are quite comparable.

We do not claim that our risk estimates represent true and accurate premiums, but rather they enabled us to systematically order the

\textsuperscript{11}This assumes separability in estimating the risk premium, in that it treats out-of-pocket health expenses as a loss which detracts from family income that can be spent on other services.
relative performance and desirability of alternative insurance plan structures. Our empirical observation was that the orderings were fairly robust to the methods used for the risk estimation.

We used Marquis and Holmer's (1986) estimate of 0.0011 (with a 95 percent confidence interval of 0.0007 – 0.0015) for 1982 for the one-year risk aversion parameter $r$. Their estimate was based on responses to HIE questionnaires about the willingness to pay for supplemental insurance plans. Their estimate is quite similar to Friedman's (1974) estimate of $r$ based on choices in federal employees plans.

We examined the effect of pure coinsurance and deductible plans on the financial risk associated with outpatient mental health care. A pure coinsurance plan reimburses a constant percentage of expenses, no matter how low or high the expenses are. There is no cap on out-of-pocket expenses unless the coinsurance rate is zero. A pure deductible plan requires that the patient pay all of the first $x$ dollars and none of the remainder.

We used both a nonparametric and a parametric (episodes simulation model) approach so that we could check how robust our results were to our methods of calculating the variances in out-of-pocket expenses on alternative insurance plans.

**Nonparametric Approach**

As an alternative to using the full set of distributional results and methods based on Keeler et al. (1986), we used the actual distribution on the free plan to predict what would happen on the pure coinsurance plans.

Starting with a random sample with replacement of free care plan families, we used the Keeler et al. (1986) plan relative estimates to randomly eliminate the expenditures for some families, and to reduce the expenditure per family with any use if the coinsurance rate was positive. For example, the proportion of users in a pure 25 percent plan is 0.86 of those with free care. More specifically, if 4 percent of free care families have any use, we select a random 3.4 (= $0.86 \times 4$) percent to have any use on the pure 25 percent plan. The size of expenses per using family was reduced from the free plan value for all of the coinsurance plans by about 20 percent.

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12 The nonparametric approach used the pure coinsurance plan relatives from Table 9.1 of Keeler et al. (1986); see Appendix A. The response on plan $k$ is stated as a proportion of that on the free care plan.

13 Based on Keeler et al. (1986). In fact the distribution of expenses differed by plan. The expenses per using family relative to the free plan, were 3 percent less for the 25 percent plan, 52 percent less for the 50 percent plan, and 8 percent less for the 95 per-
For these nonparametric estimates, we drew a random sample with replacement of 10,000 families from all five years of HIE free plan experience.

This approach preserved our earlier estimates of overall plan response, as well as the pattern of expenses across families that use mental health services. This estimate of the distribution of expenses on each plan assumes that the number of users per family in a plan is invariant to insurance coverage, which we observed to be the case on the HIE plans.

To measure financial burden, we examined the distribution of expenses across families.

Episodes Simulation Model

We also used an episodes simulation model based on the full set of results from Keeler et al. (1986) to look at the effect of alternative hypothetical insurance plan structures on total and out-of-pocket expenditures, the risk premium associated with each plan structure, and the welfare loss from moral hazard. In contrast to the nonparametric approach, which we used to estimate the effect of pure coinsurance plans, the episodes simulation model allowed us to look at the effect of caps (MDEs) on expenditures and risk. We used the model to explore two different types of caps—one on individual expenditures and another type that pools expenditures and risk across family members.

On plans with an individual limit, once the person spent out-of-pocket an amount equal to the cap, all remaining costs were paid by the insurer. For plans with family caps, the out-of-pocket expenses of all family members contributed to meeting the limit and once it was exceeded, all family members received free care.

The simulation model randomly generated the occurrence and size (cost) of episodes of mental health for each participant and family. The time to a first episode was randomly drawn from a Weibull distribution. When this time exceeded one year, no episode for the individual actually occurred. When this time was less than a year, a mental health episode occurred. The episode cost was randomly drawn from a lognormal distribution. Parameters for the Weibull and lognormal distributions varied according to the characteristics of the individual. The statistical models that related individual characteristics to Weibull

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14That is, plans with no caps and MDEs.
hazard rates (for episode occurrences) and to the lognormal mean for the cost distributions were developed in Keeler et al. (1986).

The simulation model accumulated total and out-of-pocket expenditures for each individual and each family for the complete set of alternative insurance plans. Episodes were first generated for each individual as if he had full insurance coverage with no cost sharing, that is, free care. For plans with cost sharing, episodes were then randomly deleted using price ratios estimated from the statistical analysis of episode costs. The price ratios varied according to the level of cost sharing in effect at the time of the episode.

The model included an adjustment for unmeasured tendencies for a family to spend on mental health services. We modeled this family propensity to use mental health services by introducing a family level random variate drawn from a gamma distribution with parameters $\alpha = 0.13$ and $\beta = 10.4$ into the episode generation process.

On cost-sharing plans, individuals faced different prices throughout the year. Both the size of the expenditures left before exceeding the MDE (called MDE remaining) and the coinsurance rate affected the probability that an individual responded to the episode by seeking mental health care. The rationale for the effect of the MDE remaining was: As an individual neared the MDE limit, he or she anticipated exceeding the limit and spent at an accelerated rate because care was free beyond the limit. As a consequence, each insurance year could be divided into three phases: the first phase with a large MDE remaining, the second phase with a small MDE remaining, and the third phase of free care beyond the MDE. The price ratios varied with the coinsurance rate in the large MDE remaining period, ranging from 0.32 to 0.86. For the small MDE remaining period, the price ratio was constant across plans at 0.73. Beyond the MDE the price ratio was one.

The size of the MDE remaining also affected the size of the episode. For cost-sharing plans with large MDEs remaining, HIE data indicate that episodes were 82 percent as large as those on the free plan. When the MDE remaining was small, episodes were 99 percent of the free plan size. Beyond the MDE, episodes were 30 percent larger than on the free plan. Because individuals were assumed to have at most one episode, the latter was important only for plans with family MDE limits. In this case, after the first episode occurred, other family members were more likely to have episodes and to have larger episodes, since the MDE remaining to that individual was reduced by the cost of the first family member’s episodes.

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15We found that the lognormal was slightly long-tailed. As a result, we introduced a polynomial correction factor to modify the distribution and shorten the tails.

16MDEs in excess of $35 were defined as large.
Within this model, two additional plan comparison measures were estimated: the value of the marginal services purchased and the risk premium associated with each of the insurance plans. To calculate the value of treatment, we assumed that each individual had a demand curve that was proportional to the overall demand for services, and we measured value as the out-of-pocket cost plus the consumer surplus associated with each treated episode with episode severity (probability of treatment) generated randomly. The value of services was computed from the individual's point of indifference between purchasing and not purchasing the care. At the point of indifference the value of the episode was just equal to the out-of-pocket expense. Within the model, the uniform random variate drawn to determine whether individuals on cost-sharing plans sought treatment for particular episodes was used to calculate (from the inverse demand curve) the break-even coinsurance rate, or the point of indifference between purchasing and not purchasing care. Episodes were valued at the out-of-pocket cost associated with this break-even coinsurance rate. A small adjustment was made because individuals sought slightly more care at the actual (lower) coinsurance rate. Welfare loss was then computed as the difference between total spending and this valuation of all treated episodes.

As discussed above, we assumed that the risk premium was proportional to the variance in out-of-pocket spending. The risk premium for each plan was calculated at the end of each simulation run from the observed variance in out-of-pocket spending across all families within the plan.

Our estimates of the risk premiums for the uninsured and pure coinsurance plans may be overstated. In the no insurance case (100 percent coinsurance with no cap) and for plans with no cap, we were extrapolating beyond the range of our data. People and families with large out-of-pocket expenditures and poor coverage probably received care from uncompensated care pools and public hospitals.
III. RESULTS

Using the methods just described, we examined the effects of health insurance on mental health status, use of outpatient mental health services, and the financial risk and burden faced by families for out-of-pocket expenditures on outpatient mental health care.

MENTAL HEALTH STATUS

There were few differences in mental health outcomes among the plans for the average person at the end of the study (Brook et al., 1983; Valdez et al., 1985) or over the course of the study (Wells et al., 1989a, 1989b). The results were both clinically and statistically insignificant. The results were insensitive to our methods. We observed the same pattern, whether we used analysis of variance or multiple regression methods. However, there was some evidence that different subgroups fare better with different plans.

Table 4 contains the comparisons for the mean annual change in our global mental health status measure (MHI) using analysis of variance (ANOVA), unadjusted for initial individual characteristics. Because mental health status improves over time for each plan, we present

<table>
<thead>
<tr>
<th>Comparison</th>
<th>ANOVA</th>
<th>Multiple Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diff.</td>
<td>t</td>
</tr>
<tr>
<td>Family cost sharing and free</td>
<td>-0.099</td>
<td>-0.76</td>
</tr>
<tr>
<td>Individual deductible and free</td>
<td>0.131</td>
<td>0.80</td>
</tr>
</tbody>
</table>

NOTE: A positive value indicates that the free plan is worse for MHI. Estimates are based on the full sample of 14,900 observations. The multiple regression predictions are to the enrollment sample, assigning each person to each plan in turn. This is like the usual direct age-sex adjustment, but carried out on a more extensive set of covariates.
gains or losses relative to the free plan. We observed similar insignificant estimates for the effects of insurance plan on changes in psychological well-being and distress (Wells et al., 1989a, 1989b).

As Table 4 indicates, using multiple regression to standardize for differences in initial mental health status and other covariates across the plans leaves these qualitative conclusions intact. The differences among the plans are insignificantly different from zero for the average person.

For the comparisons of MHI, we had the precision to detect rather modest effects of insurance plan on average mental health status. For example, the 95 percent confidence interval for the effect of the difference between the family cost-sharing plan and the free plan for MHI is (−0.26, 0.30) in units per year. Being laid off or fired would generate an effect equivalent to about −2.3 MHI units. Thus, we could have detected a difference equal to an eighth the effect of being fired or laid off.

Although the average individual fared no better on one health insurance plan or another, we did find some evidence that some subgroups were better off with specific plans. To test for such a possibility we included interactions among insurance plan, family income, and initial mental health status in the multiple regression model. The set of plan variables, including the interactions with income and initial mental health status, are significantly different from zero at the p ≤ 0.10 level for MHI (F(8, 14863) = 1.88).

We observed a statistically significant differential response to insurance plan depending on the combination of income and initial mental health status. Enrollees with low income and initially good mental health status tended to be significantly better off with some element of cost sharing than under free care. Enrollees who had low income and poor initial mental health status tended to do relatively better under free care. We did not have the precision to determine whether the latter group was absolutely better off under free care; but some of the estimates, although not statistically significant, were clinically large. See Wells et al. (1989a, 1989b) for fuller details.

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1MHI improved by 0.21 units per year on the free plan (not shown).
2Family income and size, site, race, age, sex, education, general health status, and role and activity limitations. See Wells et al. (1989a, 1989b).
3Plan had a statistically significant effect on changes in global mental health status because of its effect on psychological well-being, not psychological distress; see Wells et al. (1989a, 1989b).
Attrition Bias

The preceding results were based on all of the observations on mental health status. As such, they included limited information on people who dropped out of the HIE. As we noted in Sec. II, individuals who voluntarily left the study early had lower mental health status at enrollment than those who stayed to completion (p < 0.10). If these dropouts had the same response to insurance coverage as the stayers, then our plan comparisons would be unaffected by attrition. But if they had a different response to insurance plan, then our estimates of the true plan effect in a representative sample, including the dropouts, would be biased.5

To test for attrition bias, we included an indicator for being a dropout (other than by death), and interacted this with the plan variables. For MHI, we found that the dropouts had a significantly different response from the stayers, and a response that was significantly different by plan (p < 0.01). The effect of correcting for attrition is to make the family cost-sharing and individual deductible plans look better relative to the free plan. The corrected mean response on the individual deductible plan is 0.38 units better than the free plan for MHI (p < 0.08), whereas that on the family cost-sharing plans is an insignificant 0.22 units better than the free plan for MHI (p < 0.19).

We tested to see if the dropouts differed in their plan response by initial mental health status or income and by both. With a limited number of observations on dropouts, we had little precision to detect interactions, but some of the coefficients were large.6 If there is only an effect of attrition on the main plan effect, then fully correcting for attrition will also make comparisons of plan effects for specific subgroups (e.g., those with initial poor mental health status) more favorable to the family coinsurance and individual deductible plans.

4Because we downweighted observations early in the study relative to late observations, dropouts are underrepresented in the final plan estimates.

5This attrition bias does not apply to the results in Brook et al. (1983, 1984) or Valdez et al. (1986). Because they used an unweighted analysis, the dropouts had the same weight as the stayers. Thus, their plan effects fully reflect the different dropout response. Our bias results from the downweighting caused by the correction for heteroscedasticity induced by annualizing the results.

6The higher-order terms were not significantly different from zero (F(10, 342) = 1.17, p > 0.25).
USE OF OUTPATIENT PSYCHOThERAPY

Table 5 summarizes our earlier results on the effects of variations in health insurance on annual expenditures for outpatient mental health services. Such expenditures vary appreciably and significantly with insurance plan; $\chi^2 (4) = 10.41, p < 0.05$; see Manning et al. (1986). The main source of the response is in the probability of any use of mental health care, which varies from 4.3 percent on the free plan to 2.1 percent on the 95 percent plan; $\chi^2 (4) = 18.15, p < 0.01$.

Despite the large differences in the probability of any use and expenditures per enrollee, the overall rate of use of outpatient psychotherapy is low—only $37 (in 1986 dollars) per enrollee per year on a plan with no out-of-pocket cost for care.7

In contrast to the family cost-sharing plans, a small individual deductible plan ($150 per person, $450 per family per year) is insignificantly different from the free care plan.

The effect of “pure” coinsurance plans (removing the effect of the MDE) on outpatient mental health expenditures is substantially greater than that of the HIE plans. As Table 5 indicates, expenditures on the free plan are nearly four times those on a pure 95 percent plan.

Table 5

<table>
<thead>
<tr>
<th>Coverage for Mental Health Services</th>
<th>HIE Insurance Plan</th>
<th>“Pure” Coinsurance Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean t vs. Free</td>
<td>Mental</td>
</tr>
<tr>
<td>Free care (dollars)</td>
<td>36.70 -</td>
<td>100</td>
</tr>
<tr>
<td>Free care (percent)</td>
<td>100 -</td>
<td>100</td>
</tr>
<tr>
<td>Family cost sharing (% of free)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25% coinsurance</td>
<td>67 -1.33</td>
<td>70</td>
</tr>
<tr>
<td>50% coinsurance</td>
<td>57 -1.68</td>
<td>38</td>
</tr>
<tr>
<td>95% coinsurance</td>
<td>43 -2.85</td>
<td>26</td>
</tr>
<tr>
<td>Individual deductible</td>
<td>113 +0.43</td>
<td>NA</td>
</tr>
</tbody>
</table>

NOTE: Expenses per enrollee in 1986 dollars. Insurance plans subject to an annual upper limit of at most $1,000 per family per year for coinsurance plans, and $150 per person ($450 per family) per year. HIE insurance plan results are estimated means reported by Manning et al. (1986). “Pure” coinsurance plan results are estimates of the effect of a plan with no cap on out-of-pocket costs; from Keeler et al. (1986).

7And a limit of 52 reimbursable psychotherapy visits per person per year.
with no MDE or cap on out-of-pocket expenses, compared to two and a half times those on a 95 percent plan with an upper limit of $1,000 per year (Keeler et al., 1986). Expenditures on the free plan are about 40 percent higher than on a pure 25 percent plan. The difference between the 95 and 25 percent cases is due to the much lower probability of exceeding the MDE on the 25 percent plan, and receiving free care for part of the year.

There is little difference in the response of demand for outpatient psychotherapy, relative to that for outpatient general medical care, for "pure" coinsurance rates of 0 and 25 percent. But higher coinsurance rates have a greater effect on demand for outpatient psychotherapy than on demand for outpatient general medical care. We observe a similar, but less striking, and statistically insignificant difference for HIE plan groups (Manning et al., 1986). The difference between the responses to HIE plans and "pure" coinsurance rates is due to the effect of the MDE on the HIE plans.

FINANCIAL RISK

We have used both parametric and nonparametric approaches to examine the effect of health insurance plans on the financial risk associated with outpatient mental health care.

Nonparametric Estimates

There is no financial risk to the family enrolled in a plan that covers all health care costs (subject to the 52 visit psychotherapy limit). But, as the coinsurance rate rises, the estimated amount that families are willing to pay to reduce the risk rises. For example, that amount is $38.50 per family per year on a pure 95 percent coinsurance rate plan; see Table 6.8

Most of the increase in risk premium occurs between plans with a 50 and 95 percent coinsurance rate. In the absence of an increase in the amount of mental health expenses on the 50 percent plan, the reduction in the coinsurance rate would lead to a 73 percent reduction in the variance of out-of-pocket cost, and hence a 73 percent reduction in the risk premium. With the increase in demand, we observed a 65 percent reduction in the risk premium. Because the risk premium falls roughly with the square of the coinsurance rate, there are much smaller reductions in risk premiums below a coinsurance rate of 50 percent.

These estimates of the risk premium are conservative because they are based solely on the one-year risks associated with mental illness.

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8Using the assumptions in Sec. II, we can approximate the risk premium by 0.5 r * variance of out-of-pocket expenditures, where r is the risk aversion parameter.
### Table 6
EFFECTS OF INSURANCE COVERAGE ON RISK
PREMIUM AND DEADWEIGHT LOSS

<table>
<thead>
<tr>
<th>Mental Health Coinsurance Rate (%)</th>
<th>Family Risk Premium ($)</th>
<th>Loss from Mental Hazard ($)</th>
<th>Family Risk Premium Plus Loss from Moral Hazard ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (free care)</td>
<td>0.00</td>
<td>60.60</td>
<td>60.60</td>
</tr>
<tr>
<td>25</td>
<td>6.00</td>
<td>30.20</td>
<td>36.20</td>
</tr>
<tr>
<td>50</td>
<td>12.70</td>
<td>5.40</td>
<td>19.10</td>
</tr>
<tr>
<td>95</td>
<td>38.89</td>
<td>0.01</td>
<td>38.80</td>
</tr>
</tbody>
</table>

NOTE: Per family in 1986 dollars. Families weighted by the number of members.

Mental health problems and, hence, spending on mental health care tend to persist from year to year. Thus, the annual probabilities of having any expenses mask the fact that it is often the same families that have expenses year after year. This implies that the risk premium should actually be higher than the one-year numbers indicate—the risk is not that a family has a probability p of a problem costing $y to treat; instead it has a lower probability p/n of a problem costing $y dollars to treat for n years. The expected lifetime cost of the problem is the same, but the variance has been increased by a factor of (n – p)/(1 – p). Therefore, the multiyear risk premium is roughly the number of years in treatment times the one-year estimate of the risk premium.9

Unfortunately, in a study of three to five years duration, we were unable to obtain an uncensored estimate of the duration of treatment. The average family with any use of outpatient mental health care in the first three years of the study used services in 1.6 years. The average duration of treatment must be larger than that estimate.

Table 6 also shows the loss from moral hazard, ignoring the question of risk. The loss here is the difference between what the families spend on mental health care and how much they value the care. The loss increases from virtually nothing at a coinsurance rate of 95 percent, to an average over $60 (in 1986 dollars) per family with free care. The latter amount is about one-half of the actual amount spent.

The last column of Table 6 combines the losses from moral hazard and risk to obtain an estimate of the total loss for pure coinsurance

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9With multiyear risks or longer time periods, we would expect the risk aversion to change. Because we do not have a multiyear value, we have focused on the change in variance.
plans. This combined loss is a minimum somewhere in the vicinity of a 50 percent coinsurance rate if we look at annual risks. However, if allowing for multiple-year risk increased the risk premium component, the optimal coinsurance rate could shift toward 25 percent.

Episodes Simulation Model Estimates

The episodes simulation model allowed us to introduce caps or MDE limits onto hypothetical insurance plans. In these hypothetical plans, the caps on out-of-pocket costs are in 1986 dollars. We display results for the pure coinsurance plans discussed above and for plans with $500 and $1,000 caps at the three coinsurance rates, 25, 50, and 100 percent. Table 7 shows the estimated welfare loss, and the risk premium, and the combined welfare loss and risk premium for each plan. Although the estimates of the net gain from insurance from the nonparametric and parametric models differ in magnitude they have very similar optimal coinsurance rates—approximately 50 percent. In both approaches for plans with no caps (particularly the no insurance case), we were extrapolating beyond the range of the HIE data. As a result, the estimated values may not be accurate but nonetheless they do provide a good relative ordering among the plans. The similarity in findings between the two, quite different approaches reinforces our confidence in the overall pattern of results.

The introduction of a limitation on out-of-pocket expense further improves the welfare of families taking individual plans. Both the 50 percent plan with a $1,000 cap and the 100 percent coinsurance plan with a $1,000 cap are superior to the 50 percent pure coinsurance plan.

For plans with limits on out-of-pocket expenses that pool risks across family members, once the combined family expenditures exceed the cap, all family members receive free care. Because it is considerably easier for a family to exceed a given level of expenditure than it is for one individual, we also examined $2,000 limits to each of the plans considered. Our results suggest that reduction in risk associated with family caps is more than offset by the welfare loss from moral hazard. Thus, individual deductible plans may be marginally superior to family deductible plans.

The episodes simulation approach suggests that the optimal coinsurance plan has a 50 percent coinsurance rate for outpatient mental health care and an annual ceiling on out-of-pocket payments for all health services of $1,000 for individual plans and $2,000 for family plans, subject to a 52 visit annual limit on covered psychotherapy visits per individual. Allowing for multiple-year risk could shift the coinsurance rate toward 25 percent.
Table 7  
EFFECTS OF INSURANCE COVERAGE ON RISK AND LOSS FOR PLANS WITH CAPS  

<table>
<thead>
<tr>
<th>Plan Structure</th>
<th>Family Loss</th>
<th>Family Risk Premium</th>
<th>Family Risk and Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Care</td>
<td>$48.16</td>
<td>$0.00</td>
<td>$48.16</td>
</tr>
</tbody>
</table>

**Individual Plans**

<table>
<thead>
<tr>
<th></th>
<th>Family Loss</th>
<th>Family Risk Premium</th>
<th>Family Risk and Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% $500</td>
<td>$23.79</td>
<td>$11.59</td>
<td>$35.38</td>
</tr>
<tr>
<td>25% $1,000</td>
<td>$25.60</td>
<td>$17.63</td>
<td>$43.23</td>
</tr>
<tr>
<td>25% No cap</td>
<td>$25.60</td>
<td>$21.23</td>
<td>$46.83</td>
</tr>
<tr>
<td>50% $500</td>
<td>$22.18</td>
<td>$21.32</td>
<td>$43.50</td>
</tr>
<tr>
<td>50% $1,000</td>
<td>$3.88</td>
<td>$20.58</td>
<td>$24.46</td>
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<tr>
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<td>$0.00</td>
<td>$106.95</td>
<td>$106.95</td>
</tr>
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</table>

*NOTE: Average family size = 2.92. Costs in 1986 dollars.*

**FINANCIAL BURDEN**

Even if there were no uncertainty or risk associated with large bills for mental health care, there could be a financial burden associated with such treatment. One justification for cost sharing and for catastrophic caps on cost sharing is to reduce the financial burden on families who experience expensive illness even if the expense is very predictable. In the case of mental health care, the greatest financial burden occurs if an individual has one or more psychiatric
hospitalizations per year. In the HIE, the largest annual expenditure by an individual on inpatient psychiatric care was nearly $60,000 (1986 dollars). The largest expenditure by an individual for outpatient mental health care was $5,800.

Using the nonparametric approach to approximate the pure coinsurance response, we can estimate what the distribution of out-of-pocket expenses (in 1986 dollars) for outpatient mental health care would be under little or no insurance—the pure 95 percent plan. Weighting for family size, 0.7 percent of the families would have gross expenditures greater than $2,000 in a year, with the amount over $2,000 accounting for 23 percent of all outpatient mental health expenditures. Families with expenses of at least $2,000 spend about $3,100 and account for nearly two-thirds of all expenses.

Weighting for family size, 1.1 percent of the families would have gross expenditures greater than $1,000 on a pure 95 percent coinsurance rate plan. The dollar amount in excess of $1,000 accounts for 48 percent of all outpatient mental health expenditures. Families with expenses of at least $1,000 spend about $2,400 each and account for nearly four-fifths of all outpatient mental health expenses.

As with risk sharing, these estimates of financial burden are too conservative because they are based on the distribution of annual expenses, rather than lifetime expenditures. If we consider the multyear financial burden, then some families will incur much larger mental health care expenses. For example, on the free HIE plan, the top 1 percent of families had annual expenses over $2,900, compared with three-year expenses of over $7,400 for the top 1 percent over the first three years of the study.
IV. DISCUSSION

The optimal insurance benefit for mental health care depends on several effects of more generous health insurance. Among the most important of these are the gains in mental health status, the losses from increased moral hazard (buying more because you are insured), the gains from pooling the risks of unpredictable expenditures on out-patient mental health care, and the reductions in the financial burden of out-of-pocket expenses.

EFFECTS ON MENTAL HEALTH STATUS

One justification for more generous coverage is that it may improve the health status of beneficiaries. Of particular policy concern is the health of individuals who are both sick and poor. They may have inadequate financial resources to meet the cost of care for their illnesses, because they lack employer- or union-based insurance coverage. For example, Lurie et al. (1984, 1986) found that loss of Medicaid eligibility led to adverse health consequences for medically indigent adults in California.

One of the major questions for the Health Insurance Experiment was whether changing cost sharing in health insurance would affect the health status of the general population. This is not a question of whether health care is effective or not. Instead, the question is whether varying the out-of-pocket costs paid by patients will lead them and their providers to make different utilization and treatment decisions that then could affect health status.1

In the HIE, patients were protected from large financial losses by an income-related cap on out-of-pocket expenses, beyond which care was free for the remainder of the year. The poor were more likely to exceed this cap than more wealthy participants. Thus our comparisons assess the effects of generous coverage in the presence of a cap, rather than contrast some versus no coverage.2

We observed no significant adverse effects of cost-sharing insurance plans on global mental health status on average over the whole

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1 Assuming the treatments are effective.
2 Our sensitivity analyses using an expected price procedure could, in principle, solve this problem, but only at the risk of extrapolating beyond the range of the HIE design; use of this procedure did not change the qualitative pattern of the results mentioned above.
population. We had the precision to detect an effect equivalent in impact to one-eighth the effect of being laid off or fired. Correcting for attrition bias strengthened, rather than weakened, our main conclusion of no adverse effect of cost sharing in the presence of a cap on out-of-pocket expenses. After correcting for attrition bias, the participants on the individual deductible plan may have had better overall mental health status than those on the free care plan \( p = 0.08 \).

There is an important limitation to our mental health outcome conclusions. Our methods did not yield an increase in precision large enough to definitively address the very important policy question about the effects of insurance coverage on the disadvantaged—those who are both sick and poor. The confidence intervals on our estimates for this subgroup, however, include clinically large effects. Given this lack of precision, we caution against generalizing our main result to this subgroup.

What conclusion can be drawn about the optimal level of insurance generosity from these results? For policies targeted at the average person, improved mental health status per se does not appear to provide a compelling argument in favor of more generous coverage. This also minimizes any concern about our ignoring externalities in our analysis of welfare effects. However, there remains a concern about the need for more generous coverage targeted especially at persons who are both sick and poor (e.g., Medicaid), who could have been adversely affected by cost sharing, but we did not have sufficient precision to observe such an effect.

Given the absence of an adverse effect of cost sharing on mental health status averaged over the whole population, we will focus the remaining discussion largely on the effects of insurance on moral hazard and risk pooling.

**MORAL HAZARD**

One of the most important tradeoffs in choosing the level of cost sharing is the tradeoff between the losses from moral hazard (buying more because you are better insured) and the gains from pooling risks. When individuals modify their behavior in the presence of insurance, society wastes resources by meeting the increased demand. At the margin, a patient with a 25 percent coinsurance rate will purchase another visit if he values it at more than or equal to 25 percent of the cost of producing that visit. If prices reflect the cost of resources used in the visit, and assuming no externalities, then society will have spent the cost of a visit to produce something valued at 25 percent of cost,
for a loss of 75 percent of the cost of the marginal visit. Thus, if better insurance coverage increases demand for the insured service, society will sustain a loss in welfare. Society would be better off spending the resources on other goods and services.

The results from the HIE show that increasing generosity of coverage, that is, lower coinsurance rates, increases the demand for outpatient mental health care \( (p < 0.05) \). Expenditures for outpatient mental health care would be four times higher with free care (no out-of-pocket cost) than with a pure 95 percent coinsurance plan, and two and a half times higher than with a 95 percent coinsurance plan that includes an upper limit of $1,000 dollars for all health services.\(^3\) Thus, under the assumptions made above, there are welfare losses from higher use of outpatient psychotherapy associated with reducing the cost sharing for mental health care.

Although there are large proportional changes in use of mental health care as cost sharing falls, there is only a small absolute welfare loss from increased use. Even with free care, the average enrollee spent only $37 per person per year (in 1986 dollars) on outpatient psychotherapy. Our estimates suggest that the welfare loss from moral hazard on a free care plan is only half this amount, or about $18 per person per year. On a plan with a pure coinsurance rate of 50 percent, the average person would spend $14 per year, with a welfare loss of $1.40 per person per year. Either amount is a very small fraction of the welfare loss associated with moral hazard for general medical outpatient care.

Nevertheless, outpatient mental health care exhibits a more price elastic response than outpatient general medical care. The arc elasticities between 95 and 25 percent pure coinsurance rates are \(-0.8\) for outpatient mental health care and \(-0.3\) for outpatient general medical care (Keeler et al., 1986).

All other things equal, if one wanted to minimize the welfare losses from moral hazard, the coinsurance rate for mental health care should be higher than that for medical care. This is a direct result of the Ramsey (1927) pricing proposition that the greater departures from marginal cost should occur for the less price responsive demand, if the goal is to minimize the welfare loss from a given total subsidy. Specifically, the departure from marginal cost pricing is inversely proportional to the elasticity, or, equivalently, we should move to coinsurance rates that give the same proportional change in use relative to paying full price (that is, no coverage) (Baumol and Bradford, 1970).\(^4\)

\(^3\)All comparisons have a limit of 52 reimbursable visits per person per year for psychotherapy.

\(^4\)This assumes no appreciable cross-price elasticity between the demand for outpatient psychotherapy and health services from general medical providers. The HIE included plans with different coverages for medical and mental health services. The data indicate no significant cross-price effect, but there is little precision for the comparison.
If we peg the medical coinsurance rate at 25 percent, then our estimates of the difference in price response imply that the Ramsey optimal coinsurance rate for mental health care should be about 50 percent.6

Although our estimates of the pure coinsurance response are of necessity larger than our estimates of the HIE plan response, they are smaller than most price elasticity estimates by others. Contrasts of the high and low option of federal employees' plans yield a four-to-one ratio for plans that differ only slightly in their cost-sharing provisions (Reed, 1974; Hustead and Scharfstein, 1978). McGuire's (1981) study showed a price elasticity of about -1, compared to our arc elasticity of -0.8 in the 25 to 95 percent coinsurance range.

If the difference in responses for mental health and general medical care is as large as suggested by these other studies, then outpatient mental health care should have greater cost sharing. The greater the price response is, the larger will be the loss from moral hazard. To avoid this larger loss requires that the coinsurance rate be raised so that there is not as much financial inducement to higher consumption. For example, if the price elasticity is -0.8 for outpatient mental health care, then the optimal coinsurance rate is 46 percent.6 If the price elasticity is -1.0, then the optimal coinsurance rate is 52 percent.

RISK POOLING

Against the loss from moral hazard, we must contrast the gains from pooling risks through health insurance. People prefer less risky to more risky financial alternatives with the same expected value; people are willing to pay some positive amount to avoid the uncertainty altogether. By pooling risks using an insurance policy, a family can reduce its financial risk and hence increase its own welfare. The insurance pool is less risky to society because the risk goes down approximately as the inverse of the number of subscribers.

If one could costlessly write perfect indemnity insurance plans, then under fair insurance rates, the optimal insurance plan would provide full coverage. Such perfection is not achievable because (1) the insured policyholder and his or her health provider can vary the amount of service that the patient receives; and (2) the level of reimbursement is not a fixed sum, but is generally an increasing function of the patient's gross expenditures on health care. Thus, the tradeoff between the gains from risk pooling and the losses from moral hazard requires that

6Our estimate is 46 percent, based on Eq. (4) of Baumol and Bradford (1970), p. 870.
6Assuming that general medical care has a coinsurance rate of 25 percent.
we have partial rather than full risk pooling, even with actuarially fair odds (Arrow, 1963, 1971; Zeckhauser, 1970). Positive coinsurance rates and deductibles should be set so that the marginal gains from risk pooling just offset the marginal welfare losses from moral hazard.

Our estimates suggest that the gains from risk pooling partially offset the welfare losses from moral hazard. A plan with a pure coinsurance rate of 50 percent would generate welfare losses from increased moral hazard of about $4 per family per year (in 1986 dollars). At the same time, the value of the risk reduction is several times that amount ($68.79 = 106.95 - 38.16 in Table 6). Thus, a movement from practically no insurance to 50 percent coverage would generate an unambiguous increase in welfare, without having to resort to second best or Ramsey arguments. A movement to a 25 percent from a 50 percent coinsurance rate would generate an incremental net welfare loss of $6.70 per family per year, with risk reductions of about $17 per family per year only partially offsetting an increase of $22 in welfare losses from moral hazard.7

Using the estimates in Table 7, it appears that the optimal individual plans have coinsurance rates of about 50 percent for outpatient mental health care and limits on out-of-pocket expenditures of about $1,000 per year for all health services. For family plans, the coinsurance rate appears to be about 50 percent with a limit on out-of-pocket expenditures of about $1,500 per year. Individual plans are slightly better than family plans. Both are substantially better than pure coinsurance plans, which are substantially better than no coverage.

In fact, these estimates are too pessimistic about the benefits from risk pooling, because they are based on annual risk rather than lifetime risk sharing. If we consider the multiyear risks, then the value of the risk reduction would increase, because the lifetime variance across families is greater than the annual variance as a result of the positive correlation in use over time. If the mental health treatment on the average occurs over two years, rather than over one, then the net loss from lowering the family coinsurance rate from 50 to 25 percent would be halved. If the average treatment period, including periods of no use, occurs over more than three years, there would be no net loss.8

With an experiment of up to five years, such as the HIE, it is difficult to estimate the number of years in mental health treatment. For

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7 If we fit a polynomial to the total loss (risk premium plus deadweight loss) column of Table 6, the minimum total loss occurs at a coinsurance rate of 49 percent.

8 With multiyear risks or longer time periods, we would expect the risk aversion to change. Because we do not have a multiyear value, we have focused on the change in variance.
three years of data on families, 13.4 percent had some outpatient mental health care, 7.1 percent had use in only one year, and 3.9 had use in two years, for an average of 1.6 years per family treated over a three-year period. Because of the limited period of observation, this number is less than the lifetime mean.

Further, we had insufficient precision to estimate changes in demand for inpatient psychiatric care under different insurance plans. Benefits from risk pooling would be especially great for inpatient episodes because they are rare but costly events.

Thus, the magnitude of the reductions in multiyear risk, especially when including risks associated with inpatient care, may be sufficient to offset most, if not all of the losses from moral hazard from decreasing the coinsurance rate from 50 to 25 percent.

These estimates assume that the overall variance reflects risk to family, rather than heterogeneity (e.g., because of tastes) among families. The HIE data do not permit us to distinguish between these two explanations. If heterogeneity in tastes is the explanation, these risk reductions should be downplayed, and the coinsurance rate for outpatient mental health care should shift upward, because risk pooling will not offset as much of the welfare loss associated with moral hazard.

Our results for the value of risk pooling are indirect. They are based on observed variations in out-of-pocket expenses across families, rather than a more direct measurement of risk preferences.

All of these considerations lead us to suggest that the optimal coverage for outpatient mental health care is a 25 to 50 percent coinsurance rate with an annual ceiling on out-of-pocket expenses of $1,000 for individual plans and $2,000 (in 1986 dollars) for family plans for all health services, subject to a 52 visit limit annually per person for covered psychotherapy visits.

How does this recommendation compare with existing coverage? About 31 million individuals have no health insurance coverage at all (Moyer, 1989). Our results indicate that this group would be substantially better off under our recommendations than continuing to lack coverage.

According to Brady et al (1986), in 1984 one-half of those covered by private insurance had a 50 percent coinsurance rate for outpatient mental health services. For over 80 percent of those covered, there were separate limitations on covered mental health services, chiefly annual or lifetime dollar limits on coverage. For those with coinsurance rates of 50 percent and higher, total welfare loss would be greater than under the set of recommendations offered here, especially because of the absence in prevailing plans of an upper limit on out-of-pocket expenditures. For those whose existing plan has a coinsurance
rate lower than 50 percent, welfare loss to society resulting from moral
hazard would be greater and financial risk might be greater (because of
the lack of an upper limit on out-of-pocket payments) depending on
the coinsurance rate and the magnitude of any limits on covered visits
on dollars.

Given a 52 visit annual limit on covered psychotherapy, our results
suggest that individuals in prevailing plans with a 50 percent coin-
surance rate for mental health care would be better off if an upper
limit on out-of-pocket expenses were introduced, rather than a lower
(i.e., more generous) coinsurance rate.

LIMITATIONS

The HIE is a randomized trial specifically designed to investigate
the effects of variation in insurance coverage on health status, includ-
ing general mental health status on a non-aged civilian population.
The experiment excluded the elderly, the Medicare disabled, and those
institutionalized in long-term hospitals and jails. Thus, the results
below do not necessarily apply to several groups of persons with
psychiatric disorders who are of considerable current policy interest.
Moreover although our sample did include individuals who were both
sick and poor, our conclusions for this important subgroup are limited
by small sample size.

This study did not address the issue of changes in insurance on the
entire mental health care system. The HIE sample constitutes a small
portion of each site's population. Hence, we did not expect to see any
changes in clinicians' fees or the availability of providers or facilities as
a result of study implementation. Instead, our results apply to changes
in behavior by patients and their providers directly, rather than to the
full interaction of the demand and supply of services.

These results apply to situations without adverse selection. Any sin-
gle employer who improved its insurance package may observe larger
effects, especially on expenditures, than reported here. As a result of
better coverage, the employer might attract new employees seeking to
reduce their out-of-pocket costs for mental health treatment through
better coverage; it would also encourage current employees to elect to
add spouses and other dependents. Instead, our results apply to situ-
tations without adverse selection, such as the impact of changes in man-
dated coverage for outpatient mental health care.

Finally, our results for “optimal” insurance plans apply to insurance
plans that cover only outpatient mental health care. We have not
examined the effect of medical care demand on mental health
insurance, or of insurance plans with separate deductibles, coinsurance rates, and stoplosses for outpatient mental health care. The “optimal” plan could change markedly if inpatient psychiatric care were included, or if the plan features were common with general medical care. Because inpatient care episodes are rarer and more expensive than outpatient care, risk aversion alone would suggest that a combined inpatient and outpatient mental health insurance plan should have a lower coinsurance rate than an outpatient only plan.\(^9\)

It is difficult to say how much our optimal policy would change from introducing demand for medical care into our analysis. If the demands for medical and mental health care are positively correlated, including medical care would increase the variability in expenditures and hence the gains from risk sharing. The result would be a lower coinsurance rate. If the stoplosses or deductibles were common, then large medical losses could lead to increased moral hazard for mental health care when the individual exceeds the deductible or stoploss. This would tend to lead to higher coinsurance rates. There is also the complication of whether medical and mental health care are substitutes or complements. Although the so-called “offset” literature suggests that they are to some extent substitutes, the empirical basis for this conclusion is weak. For discussions of this literature, see Manning et al. (1986), Schlesinger et al. (1983), and Borus et al. (1985).

CONCLUSIONS

Our results indicate that, in the presence of an upper limit on out-of-pocket expenditures, there is no adverse effect of cost sharing on the mental health status of the average person, but there may be for the neediest groups. Thus, decisions for the general population can focus on the tradeoff between moral hazard and pooling risks.

We have confirmed that decreased cost sharing leads to substantial proportional increases in the use of outpatient mental health services. With free care, expenditures would be nearly four times as high as if there were no health insurance. This increased use of mental health services implies a welfare loss, because of the greater use of mental health care, by an amount half as large as the mean annual expenditures on the free plan ($37 per person per year in 1986 dollars).

\(^9\)This assumes that the inpatient care is no more price responsive than outpatient care. Although the HIE was too small to test this conjecture, it is consistent with the HIE finding that inpatient care in general is less price responsive than outpatient care in general.
Because mental health care is more responsive to price than outpatient general medical care, the welfare losses from moral hazard are larger relatively than those for medical care. If the welfare losses from moral hazard were the sole concern, then outpatient mental health care should be less generously covered—the coinsurance rate should be higher—than outpatient medical care.

However, these welfare losses from moral hazard are partially offset by the reduction in risks to the family that health insurance provides. These offsetting gains may make coinsurance rates for outpatient mental health services of 25 to 50 percent and an upper limit on out-of-patient expenditures (in 1986 dollars) of $1,000 per person or $2,000 per family for all health services (subject to an annual limit on covered psychotherapy visits) desirable. The exact balance depends on: (1) how much of the variance in out-of-pocket expenses is risk and how much is heterogeneity in tastes; and (2) the number of years that users remain under treatment. The greater the role of risk, and the greater the number of years of treatment, the lower the optimal coinsurance rate.
### Appendix

**PURE COINSURANCE PLAN ESTIMATES**

**EXPECTED NUMBER AND COSTS OF MENTAL HEALTH EPISODES IF INSURANCE PLAN HAS NO MDE**

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**NOTE:** Adjusted to rates and costs in second-year Seattle (1977 dollars). The total costs and annual probability are derived first and the cost per episode obtained by division of costs by probability. Reprinted from Keeler et al. (1986), Table 9.11.
BIBLIOGRAPHY

Brook, R. H., J. E. Ware, Jr., A. Davies-Avery, et al., "Overview of Adult Health Status Measures Fielded in RAND'S Health Insurance Study," Medical Care, Vol. 17 (Suppl), 1979, pp. 1–131.
Brook, R. H., J. E. Ware, Jr., W. H. Rogers, et al., The Effect of Co-Insurance on the Health of Adults: Results from the RAND Health Insurance Experiment, The RAND Corporation, R-3055-HHS, December 1984.


