11-1-2008

The Effect of Managed and Traditional Care Insurance Plans on Horizontal Inequity in Access to Health Care in the United States

Frank Puffer

Elizabeth Pitney Seidler
College of the Holy Cross, eseidler@holycross.edu

The Effect of Managed and Traditional Care Insurance Plans on Horizontal Inequity in Access to Health Care in the United States

By

Frank Puffer

and

Elizabeth Pitney Seidler

November 2008

COLLEGE OF THE HOLY CROSS, DEPARTMENT OF ECONOMICS
FACULTY RESEARCH SERIES, PAPER NO. 08-14*

Department of Economics
College of the Holy Cross
Box 45A
Worcester, Massachusetts 01610
(508) 793-3362 (phone)
(508) 793-3710 (fax)

http://www.holycross.edu/departments/economics/website

The Effect of Managed and Traditional Care Insurance Plans on Horizontal Inequity in Access to Health Care in the United States

By
Frank Puffer[†]
Clark University

and

Elizabeth Pitney Seidler[††]
College of the Holy Cross

November 2008

Abstract

This study examines income inequity in access to health care in the United States. Given the predominant and growing presence of managed care organizations as a source of medical insurance and care in both the private and public settings, replacing traditional indemnity plans as a lower cost prophylactic alternative, we speculate that the presence of Managed Care Organizations would reduce, if not eliminate, any pro wealthy bias in access to health care for the insured population in the U.S. We rely on previously developed methodology from the EcuityII project, incorporating the health inequity index (HI_{WV}), to estimate income inequity in traditional indemnity and managed care plans. Our results are surprisingly counterintuitive to the expected result that managed care was designed to have on access to care. The calculated HI_{WV} indicates a relatively greater pro wealthy bias in the managed care group. This result has important and direct policy implications as public insurance programs in the U.S. contract with managed care organizations as a lower cost alternative for Medicaid and Medicare beneficiaries.

JEL Classification Codes: J32, J33

Keywords: access, equity, managed care

[†]Department of Economics, Clark University, 950 Main St., Worcester, MA, fpuffer@clarku.edu

[††]Department of Economics, College of the Holy Cross, Worcester, MA 01610-2395, 508-793-3673 (phone), 508-793-3710 (fax), eseidler@holycross.edu

Introduction

The United States has for some time been a conspicuous exception to the general rule of universal health insurance coverage among advanced industrial countries. Though public programs (most notably, Medicare and Medicaid) exist to provide insurance for some of the members of the population unable to afford private insurance, the last three decades have been characterized by substantial increases in the number of uninsured in the U.S. In 1977, 8.7% of the population had no form of insurance; and by 1987, the proportion of uninsured had increased to 10.3% and to 12.2% in 1996; moreover, at any given point during a year, the proportion of uninsured is likely to be higher [1]. Notwithstanding the availability of public insurance programs, there continues to be concern about equality of access to care. In particular, the roughly fifteen percent of the population without any health insurance would appear to be at a particular disadvantage in obtaining health care.

Less obviously, the type of insurance coverage may also play a role in access to health care. Managed Care Organization (MCO) insurance programs have become increasingly important in the U.S. over time, with a corresponding reduction in the proportion of the population covered by the more traditional combination of indemnity insurance with fee-for-service (FFS) medical care. Health Maintenance Organization (HMO) enrollment increased from 3% to 13.3% of the insured population from 1977 to 1987, and to 42% in 1996 [2]. If managed care influences access to care differently from traditional care, the consequences are thus potentially quite substantial.

We consider two types of access effects that managed care might have. The first, which has drawn far more attention in the literature and which we deal with only in passing in this paper, is that managed care would be expected to provide less care per capita as measured by health care resource utilization. One would expect this result because of the different economic incentives placed on care providers based on the business model employed. Even advocates of managed care expect to see reductions in medical resource use as a part of eliminating unnecessary care and providing necessary care more efficiently. A great deal of research has been conducted on resource use in managed care, both at the individual medical condition level, as well as overall.

Horizontal equity (i.e. equal care for equal need) has been compared among select EU countries and the United States. The European Union's Biomed Programme funded the ECuity project, whose members worked on a multi-year multi-country project entitled "Equity in the Finance and Delivery of Health Care in Europe." The participants examined horizontal inequities in the delivery of health care in their own countries. The United States results showed that, for a given need, that although the wealthy do not necessarily get more care in terms of volume (i.e. physician visits, specialist visits, and inpatient care days), there is evidence of a pro-wealthy bias when actual expenditures for these services are considered [3].

More recently, U.S. results show that there is an unadjusted pro-poor bias in medical care utilization, and that as need, region, and the existence of private insurance are accounted

for, the bias switches and becomes pro-rich [4]. However, relatively little attention has been given to the issue of the role of the type of insurance plan (FFS or MCO) in affecting equity of access across income levels. This is the main concern of this paper. We use the methodology developed in the EcuityII project to investigate the degree of horizontal inequity in managed care and traditional insurance plans in the United States. In addition to allowing for direct analysis of the effect that type of insurance has on equity in access to health care in the U.S., this approach has the advantage of allowing good comparisons between the U.S. and other industrialized countries for the total (insured and uninsured) populations. At the center of the EcuityII project has been the insistence on the use of data sets that are as similar as possible and similar statistical analyses for all countries; thus, there are a number of international comparisons that can be made without speculating on the effects of differing data sets and econometric approaches.

The first section is a brief overview of the definition and estimation techniques for horizontal inequity in the delivery of health care. Since this is a topic that has been well covered in other papers arising from the ECuity II project, this will be a summary rather than the full explanation that can be found in cited sources. The second section discusses relevant changes and trends in the health care system in the United States, with a particular focus on the different incentives characteristic of FFS and MCO designed insurance plans. We then discuss our data set, the 1996 Medical Expenditure Panel Survey (MEPS), and our results. Finally, there is a discussion of the importance of the findings and possible explanations.

Health Inequality Measures and Estimation Techniques

The health inequality measures and estimation techniques in this study closely follow previous work on horizontal inequity in EU and OECD countries [3, 4]. Specifically, the health inequality index, HI_{WV} [5], and the indirect standardization method are applied to the MEPS data set, with some additional grouping of data in order to compare equity within insurance categories.

Unstandardized income quintile distributions report the average use of the particular type of medical care by the individuals in the given quintile. The standardized quintile distributions adjust the actual values by first estimating the expected use by quintile, and then adding the difference between the observed and expected use to overall mean use. The expected use is estimated as predicted values from a regression of health care use on health status, age, and gender variables.

Standardization of need allows a comparison of the distribution of medical care across income with a distribution that is adjusted for need. Health status (self-reported as well as a measure of disability), age, and gender variables are used to standardize for need for medical care. We identify three measures of medical care in our estimations: physician visits, hospital nights, and total medical expenditures. Standardization is performed for the entire insured population, then separately for the FFS and MCO populations. This method

of standardizing for need assumes that the health care system, overall, meets medical need, in that on average, the health care system provides just the right amount of care for an individual with a given set of characteristics to be standardized on. We can estimate what that level of care is, and then examine the data to see if there are systematic income-related variations in the difference between the amount of medical care actually provided, and what needs to be provided.

A concentration curve approach is used to estimate the index for horizontal inequity in the delivery of health care. The health equity index, HI_{WV}, is a measure derived from first, obtaining a concentration index that reports the degree of inequality in the distribution of medical care (unadjusted for need), and second, a concentration index of need, which uses a two-part model to predict utilization of medical care, given need. The cumulative percent of the population, ranked by income, is measured against the cumulative percent of medical care utilization (actual and predicted). The difference in the concentration indices directly calculates the health equity index. For instance, if the need-adjusted concentration curve lies above the concentration curve that has not been adjusted for need, then there is a pro-rich bias in the delivery of medical care, and the calculated index has a value greater than zero. Alternatively, if the need-adjusted curve lies below the unadjusted curve, then the interpretation is a pro-poor bias, and HI_{WV} is less than zero. If the index is zero, it cannot be assumed that no bias exists, as a pro-rich bias observed in one curve may cancel the pro-poor bias in the other if the curves cross such that the area under each (relative to the diagonal) is the same [5].

The prediction of health care utilization, as adjusted for need, is achieved using a two-part estimation method. The logistic regression in the two-part model estimates the probability of any utilization of health care. Part two of the specification uses a truncated negative binomial count model to return the expected value of the utilization of health care, given positive utilization estimates as returned in the logit specification [4]. We rely on the two-part model of demand for medical care for our subpopulations (MCO and FFS) as a better predictor of actual outcomes than a sample selection model because of the smaller MFSE (mean square forecasting error) associated with the two-part model [6, 7]. Furthermore, as we are not as concerned with parameter estimates, per se, as with predicted utilization, any selection bias not addressed by standardization for a particular subpopulation is likewise observed in the estimation for the alternative subpopulation, and thus, still allows for an opportunity for comparison between the plans.

A significant design note is the consideration of survey design effects. Models that rely on standard regression techniques will typically understate the standard errors of the estimates. This could result in attribution of an explanatory effect where none exists. The survey-specific models take into account the design effect of the survey and are therefore a truer estimate of the independent effect. To obtain estimates of variability (such as the standard error of sample estimates or corresponding confidence intervals) for estimates based on the survey data, one needs to take into account the complex sample design for both person and family level analyses. The data set includes the appropriate strata and psu (primary sampling unit) identifier variables, as well as a sampling weight (the inverse of the

probability that the observation is included in the design) to correct for the loss of precision in variance estimation associated with the sample design (i.e. observations are not independent and identically distributed in a complex survey). Simply applying the independently and identically distributed methodology for analysis would lead to biased point estimators and variance estimates that would likely understate the level of uncertainty associated with the estimates [8]. The results will be substantially more reliable than results obtained without considering design effects.

Health Care and Insurance in the U.S.

Over the last 30 years, there have been considerable changes in the structure of the medical care industry in the United States. The changes are primarily associated with the administration and financing of medical care towards a goal of increasing efficiency and reducing costs. The result has been the introduction and prevalence of MCOs that have made major inroads on the more traditional form of health care insurance. Of the insured population in the U.S. (those less than sixty-five years old, as virtually all persons sixty-five and over have Medicare), a significant number are now enrolled in some type of managed care plan. In 1996, nearly 42% of the insured population was enrolled in a Health Maintenance Organization (HMO), and nearly 36.5% of those publicly insured were covered by managed care. This is more than triple the rate, 13.3%, of the total population HMO enrollment in 1987 [2].

Given the complex nature of managed care, it is important to note that the term "HMO" is not often used in terms of its strict definition(s). To the typical user or provider of health care, "HMO" has come to mean any plan under which the enrollee has a limited choice in provider selection, and thus is often used to indicate any type of managed care plan. That is, it has become the term that describes every type of plan that is *not* fee-for service. Because of this common technical misunderstanding, the term HMO in our estimates includes anyone covered by a managed care plan.

The 1996 MEPS survey determined HMO vs. other MCO enrollment based on a series of questions about plan characteristics. The determination of the respondent's status as an HMO enrollee (public or private) was based on three types of questions: 1) Do you belong to an HMO?, 2) Are you covered by your HMO if you see a physician who is not an HMO doctor without a referral?, and 3) Must your primary care doctor be chosen from a list provided by your insurer? Yes to any of these would indicate HMO enrollment. Because cognitive studies conducted prior to the survey indicated people's inability to distinguish between plans within managed care, it makes sense to combine the MCO and HMO status variables. In 1996, HMO enrollees were primarily covered by private insurance, tended to be young adults and children (47.6% of the privately insured non-elderly population belonged to an HMO), and were slightly skewed toward the upper income thresholds (45.6% high income and 37% low income of the insured were enrolled in an HMO). Differences in health status for HMO participants were concentrated among the publicly insured. Those who reported needing assistance to perform daily activities, or who were unable to work because of a chronic condition were more likely to be enrolled in an HMO [9].

Of the total population (insured and uninsured) in 1996, the reported rates for MCO and HMO were as follows: 1.7% in a Medicare HMO, 4.8% in a Medicaid HMO, 26.9% in a private HMO, 4.5% in a private MCO, and .08% in a Medicaid MCO. In total, 33.46% belonged to an HMO, and 5.4% reported membership in an MCO. In 1987, the data reflect HMO membership based on the respondent's identification of his health plan from a list of local HMOs in each of four rounds. Estimates of HMO enrollment in 1987 use a constructed variable that reflects full-year enrollment and group policyholders' selections of HMO coverage for their members [2]. Taken separately, the 1987 data indicate round-specific enrollment rates ranging from 8.3 – 10.4% of the total population.

HMO enrollment increased from 3% to 13.3% of the insured population from 1977 to 1987. This is not a surprising result as HMOs were not a dominant business plan in 1977. In 1987, 76% of people in HMOs had the option of choosing a FFS program from menu of benefits and 31% of those enrolled in FFS had an HMO as an option. The result is that although the members of HMOs are likely to be younger, they are not necessarily healthier. This finding is attributed to the possibility that younger people with young families choose the HMO option because it has lower out-of-pocket costs and that there is not an established long-term relationship with a physician. Persons with chronic conditions such as diabetes and cancer were more likely to be enrolled in a FFS program (probably due to a relationship with the treating physician and the emotional costs of switching providers). The near poor (those with incomes of 100-124% of the poverty level income) were more likely to be enrolled in a FFS

- perhaps the influence of Medicaid enrollees or more limited options offered by employers in "blue collar" jobs [2].

The transformation of the medical services industry from one dominated by traditional indemnity business plans, to a market-driven industry based on the costs of providing service has contributed to a variety of downstream changes that affect access to medical care [1]. Some of these effects include:

- the redistribution of the insured population from indemnity plans to managed care (MCO)
- a reduction in hospital-based services
- a net decrease in the number of hospitals and long-term and special care facilities
- the elimination of many community-based programs that target the medically underserved
- an increase in premiums and co-payments for the insured
- policy initiatives at the state and federal levels that address quality and availability of health care services and health insurance.

The primary focus of MCOs is to control costs through patient utilization programs and financial incentives (disincentives) to providers. The most restrictive utilization programs imposed on the provider would require that a physician obtain approval prior to using an expensive test or treatment for a particular patient, or use only lower cost, MCO approved facilities for patient care, despite medical need as determined by the physician. Another type

of financial disincentive for the physician is the utilization review. Upon review of diagnosis and subsequent treatment, if the doctor fails to justify treatment and procedures performed within the guidelines established by the insurer, reimbursement will be denied. MCOs also use “guidelines” and “care paths” as vehicles to control costs. Rather than mandating particular courses of treatment, social workers employed by the MCO (or the physician provider group practice) will consult the doctor as to the insurance company’s recommended course of treatment for a particular disease. A third and prominent feature of HMOs is a utilization management technique that makes the PCP the “gate keeper” for referrals to more costly specialists. In addition, the MCO physician is increasingly responsible for coordinating all levels of individual patient care, e.g. contacting nursing homes or rehabilitation facilities to admit a patient for care. This has created additional time burdens for the physicians [10].

The predominance of MCOs has an effect on the amount of care provided because of the incentive-based nature of the relationship with the providers, i.e., financial incentives placed on providers serve as tools to manage resource utilization indirectly. These arrangements carry varying degrees of financial risk (and reward) for the provider and the insurer. The restrictions on provider care and the financial risks faced by the physician/provider would predict lower utilization of medical care in MCOs except for the patient or physician who aggressively seeks particular medical treatment.

Providers who contract with an MCO typically receive a preset dollar amount for each enrollee, regardless of the actual costs of providing the medical services. A provider’s incentive to maintain a profit may be a disincentive to more costly treatment such as

making a patient referral for specialized care or hospital admission, except in acute cases [11].

Discounting may also affect the quality and amount of care provided to patients. As providers agree to accept discounted payments for services provided, they are likely to minimize costs and potentially put quality at risk. This is not a trivial issue in the health care industry. An individual's health may be compromised because of the incentives conceived by MCOs (in addition to tort reform in the mid-1980s that limited a plaintiff's compensation for malpractice and legislative protection of HMOs against malpractice claims). Under indemnity insurance plans, providers were more likely to make referrals, order expensive tests, and provide "more" care if a medical issue presented or was suspected in a patient (in part to avoid malpractice claims for missed or incorrect diagnoses). A "treat 'em and street 'em" approach is more common under Managed Care Plans than under indemnity plans. The disincentive to treat, except in the most obvious and acute cases, is balanced against: first, the probability of a severe result due to misdiagnosis and the consequent (possibly more severe or untreatable) health issues, and second, the probability of a formal complaint to the state licensing board or a malpractice action [1]. These developments in the evolution of health care plans in the U.S. indicate that as the insurers and employers look to pass along more of the cost to the enrollees, the effect might be to deliver advantages in health care to the wealthy that would be financially unattainable for others [12]. The expenditure inequity is likely to be magnified as many health insurers now offer "tiered" plans that charge a significant co-pay to patients who elect to use a more

expensive teaching hospital for care - specialist or inpatient - and a discount to those who use community hospitals [13, 14]. Employers are looking for reduced premiums (while giving employees more options) and, as a way to control costs, insurers are passing along the cost of high-tech treatment to patients. At least for now, MCOs that offer this arrangement will continue to offer more "traditional" coverage, though at a higher premium, and offer the tiered plan to employers at a 2-9% discount. Currently, PacifiCare, with presence in eight states, Aetna (New England), Blue Cross/Blue Shield (national presence) and Tufts (New England) offer this arrangement. Community hospitals, which have been increasingly forced to close their doors for lack of occupancy, may see a benefit as fewer people elect the higher cost academic centers.

The policy concern is that appropriate medical care may not be available for those who cannot afford the surcharge. There is additional concern that people who live in urban areas, where the academic hospitals tend to be concentrated, will be placed out of care as they frequently use these centers as their "community" hospitals. In terms of measuring equity vis-à-vis income under a tiered system, it is likely that there would be a pro rich bias in expenditures on medical care, but income would have less of an effect on utilization as measured by physician visits and nights-in-hospital. That is, if the wealthier population substitutes the academic centers for the lower cost care, then count data such as hospital and physician (specialist and PCP) visits will not exhibit inequities in medical care.

Data and Estimation

The data for the US are taken from the Household component of the 1996 round of the Medical Expenditure Panel Survey [15]. The survey was conducted by the United States Agency for Health Research and Quality under the direction of the United States Department of Health and Human Services. It contains data on the financing and use of medical care in the United States. There are four primary components: household, medical provider, insurance, and nursing home. This study will use only the data from the household component. The respondents for the household component include only the civilian, non-institutionalized population. The data include information on health expenditures, use of medical services, and financing of medical expenditures as well as standard demographic characteristics.

The Medical Expenditure Panel Survey (MEPS) household components are stratified multistage samples that over-sample populations of policy interest such as the elderly, the poor, and minority populations and have 22,600 observations. The 1996 Household Component uses an overlapping panel design in which data are collected through a preliminary contact followed by a series of five rounds of interviews over a two and one-half year period. Data on medical expenditures and use for two calendar years are collected from each household. The overlapping panel design allows investigators to estimate current and continuing expenditures on healthcare and other population characteristics. The sampling frame for the MEPS Household Component is drawn from respondents to the National Health Interview Survey (NHIS), conducted by NCHS. NHIS provides a

nationally representative sample of the U.S. civilian noninstitutionalized population, with over sampling of Hispanics and blacks. The year 1996 was the first year of the panel survey, and while public use files have been released for a number of subsequent years, information classifying the insurance plans into managed care (MCO) vs. traditional (FFS) was only provided in the 1996 data set.

Following the ECuityII protocol, we select variables that include information about health care use, income levels, health status, limitations from chronic illness, and other variables that might affect use of health care. The limitations of the primary data source for ECuityII, the European Community Household Panel, meant that the number of physician visits and the number of hospital nights were the two primary measures of use of medical resources. We follow this by using a count of the number of physician visits including office visits, outpatient contacts, and emergency room contacts. For hospital use, we use the number of nights spent in a hospital. In addition, we use total expenditures on all types of medical care as an additional measure of resource use. Total expenditures have the advantage of providing some degree of adjustment for differing levels of quality of the services provided, as well as partially compensating for the effect of different general approaches to treatment - for example, heavier reliance on drug therapy for some subpopulations vs. heavier reliance on hospitalization for others.

The income variable used is household after tax income per equivalent adult. Since the income data in MEPS are gross income before taxes, it was necessary to estimate income tax payments. The lack of sufficient geographical data made it impossible to estimate

either state or local income taxes, but federal taxes were estimated using the National Bureau of Economic Research TAXSIM model where possible, which was the great majority of the households, and simpler imputation of taxes by income and household size for the remainder. The modified OECD equivalence scale was used to calculate the number of equivalent adults in the household. Included in income were employment and self-employment earnings, public and private transfer payments, and earnings from property and other investments. Imputed rent from owner-occupied dwellings and fringe benefits paid by employers were not included.

Health status was measured in two ways. The first is a self-assessed health status rating for overall health of excellent, very good, good, fair, and poor. The second was reported presence of any chronic condition that limited in any way the ability to work at a job, do housework, or go to school. Age and gender were accounted for by a set of eleven age-gender dummy variables with age breaks of 15, 30, 45, 60, and 70.

Results and discussion

As discussed earlier in the paper, there are two different types of results. The first is a set of tables showing the actual and standardized distributions of health care by income quintile. The second is a set of health inequality indices for different types of health care. Table 1 reports the quintile results and Table 2 the health inequality indices. In addition, Table 3 contains a number of tabulations that are of use in the interpretation of the results in Tables 1 and 2. The entire population was divided into the five quintiles of after-tax

household income per equivalent adult, establishing income ranges for each quintile. These quintile ranges are then used to report means for those insured under MCO and FFS plans. As a result, the number, for example, of MCO individuals in a given quintile may vary somewhat from the expected one-fifth since it is the overall population income distribution that is being used rather than the MCO subpopulation distribution. Thus, when we compare individuals in the first quintile of the MCO individuals with individuals in the first quintile of the FFS subpopulation, they both fall in the same absolute income range, rather than simply being the lowest 20% of their particular subpopulation.

Mean Resource Utilization by Income Quintile

The first of the two sub tables within Table 1 gives the mean use of the particular type of health care resource under both MCO and FFS plans. The second sub table reports the same information after being standardized, as described earlier, for differences in the age, gender, and health status of the members of the sample. Overall means are reported, and to give a sense of the degree of inequality, two additional summary measures are included. The first is the ratio of the lowest to highest quintiles. A value greater than one suggests a pro-poor distribution. The second is the difference between the lowest and highest quintile. Here a positive value suggests a pro-poor distribution.

The most striking finding in Table 1 is that with managed care there is a clear pattern of both less overall use of medical resources, which is to be expected, but also a clear pattern of relatively pro-rich distribution of care by income quintile, when compared with

traditional care. The actual number of MCO physician visits rises slightly as the level of income increases, but when adjusted for the generally greater need of the low-income population, the pro-rich distribution becomes very pronounced. Traditional care, on the other hand, shows a slightly pro-poor distribution of actual doctor visits, which when standardized, shows a pro-rich distribution, although not as strongly as the MCO result.

With hospital nights, the picture is somewhat different, although managed care remains relatively more pro-rich than traditional care. Once again, MCO enrollees use fewer hospital nights per person than traditional care, and the difference is more pronounced than with doctors visits. The actual use is distributed in a pro-poor direction, but when standardized for need variables, we observe an MCO distribution that is not obviously pro-poor or pro-rich, while the FFS distribution appears to be slightly more pro-poor than the MCO distribution.

Turning to total medical care expenditures, we see a pattern that resembles the pattern shown by doctors visits. The actual MCO expenditures are slightly pro-rich, reaching their highest level in the top income quintile. FFS medical care expenditures are highest in the lowest income quintiles, showing a generally pro-poor distribution. After standardization, we find a pro-rich distribution in both cases, but more pronounced for MCOs.

Health Inequity Index by Resource Utilization

In Table 2 we report the health inequality indices for two different insured MCO and FFS populations given three types of resource utilization, namely: doctors visits, hospital nights,

and total medical expenditures. The first two rows in each sub table report the adjusted index for the insured populations under FFS and MCO plans, inclusive of all ages. We then estimate the index for insured sub-samples by age. Specifically, the user of each resource is classified as being either under sixty-five years old, or age sixty-five and older, as virtually all people age sixty-five and older in the United States are covered by Medicare. (Until the mid-90s, Medicare typically enrolled its members in a FFS plan with participating physicians and hospitals providing care. More recently, the Federal Government has contracted with MCOs to enroll Medicare eligible participants).

Each table by resource utilization includes an index for the entire US population (insured and uninsured). For doctors visits only, we consider the previously reported need-adjusted indices for Canada, the UK and Germany [4]. The first index for each population is adjusted to reflect medical need [6, 16]. Additional modifications are then considered to account for regional, private insurance, and educational effects [4].

For characteristics that are not standardized for, such as race or ethnicity, it would be easier for disproportionate concentrations in the higher or lower income quintiles of MCO vs. FFS users to create a bias. However, the proportions of the two substantial minority racial and ethnic groups in the US, Hispanics and non-Hispanic blacks, do not appear to be greatly different in the two types of medical care. Private and public insurance, on the other hand, do show substantially different patterns in distribution across managed and traditional care plan users. This suggests the possible introduction of a bias because of different incentives

and provisions of insurance plans. Upon closer examination, much of the difference is a direct result of the differences in the proportion of the 65 and over age group; the higher proportion of the elderly in the traditional care plans is almost exactly paralleled by a similarly higher proportion of those with some public insurance. In the lower income quintiles, other public insurance programs start to have some importance, and the age effect is lessened.

A potentially more interesting variable is the dummy variable for any private insurance. Those in FFS are over twice as likely to lack any private insurance as those in MCOs. Previous work has shown the provision of private insurance to have an effect on the degree of inequality in the provision of doctors visits in the US [4]; it may be that taking account of the degree of private insurance in managed vs. traditional care may shed some light on the source of the differences in inequality. Another variable that shows some pattern of variation is the census regions of the traditional and managed care users. Managed care is better established on the two coasts of the country, showing up particularly strongly in the West. Traditional care is more likely in the South and the Midwest of the US.

After including dummy variables representing regions and private health insurance to the list of need-related variables, we see what effect these additional variables have on the HI_{wv} index. These are, of course, not variables that actually represent a plausible need for health care; however, if their presence sharply reduces or eliminates the measured inequality, it suggests that the added variables are possibly part of the reason for the inequality we see in the estimates with the "correct" need variables.

Starting with the MCO and FFS indices for the entire population, we find confirmation of the pictures shown by the quintile results. Remembering that positive index values are pro-rich and negative values are pro-poor, we find that for the three categories of medical care - doctors visits, hospital nights, and total expenditures - the MCO index is more positive (pro rich) than the FFS index. In the case of managed care, the index for doctors visits is significantly greater than zero, as is the somewhat smaller index for doctors visits under traditional care. FFS has a significantly pro-poor distribution of hospital nights, while MCO shows a small and insignificant pro-poor index. In the case of total health care expenditures, neither of the indices is statistically significant, but the positive index for managed care is considerably larger than the index for traditional care.

There are a number of possible explanations for these results. It may be that there is a problem in the standardization and that in spite of standardizing with self assessed health, self-reported chronic limitations, age and gender, the lower income quintile users of managed care are actually healthier than their health status suggests. This would mean they actually need less medical care than estimated, while at the same time, this bias does not exist in the measurement of the upper income quintile users. This could be the result of a compositional effect. If a particular group, (low-income non-Hispanic blacks, for example), were to systematically underestimate health status relative to its true value (there is no evidence that this is the case) and if they were heavily represented in the MCO subpopulation and not in the FFS subpopulation, it would artificially create an impression of a relatively pro-rich bias in the MCO group assuming that the care they received was

appropriate to their actual health status (relatively good) rather than their reported health status (relatively poor).

The result of further adjusting the estimates for regional differences and private insurance status, for the total population is as follows. The effect on the provision of doctors visits is to make modest reductions in the pro-rich bias for all types of providers, but still leaves managed care as clearly more pro-rich than traditional care or the entire US health care system, including the uninsured. With hospital nights, the shift is in the pro-rich direction. Managed care hospital night provision now appears to be slightly pro-rich rather than pro-poor, while traditional care is slightly less pro-poor than it was before. With respect to total medical care expenditures, the addition of the regional and private insurance variables essentially eliminates any pro-rich or poor bias from FFS, while only accounting for a quarter of the pro-rich bias of the MCO total expenditures.

To put these findings in context, we can compare them with the inequality indices for the entire US household population. While the MCO and FFS care indices are calculated for a subpopulation consisting of those insured under the respective types of plan, the entire household population includes not only the insured, but also those without any health insurance. The health inequality indices for the entire population show a pro-rich distribution for doctors visits and total spending and a pro-poor distribution for hospital nights. However, all of these indices are more pro-poor than the corresponding indices for MCOs. In other words, although all of the individuals in managed care have insurance, it nevertheless appears that there is more of a pro-rich bias in the managed care system than

there is in the general population even if we included those without any health insurance. This would suggest that even the universal provision of managed health care insurance would not necessarily reduce the degree of pro-rich distribution of medical care, but would quite possibly make it worse. This is a counter-intuitive finding. Since one would assume that the lack of health insurance would reduce access and, given the lower the income quintile, the more likely one is to not have any health insurance; it would be expected that a population with a substantial minority without health insurance would show a more pro-rich distribution of access to health care. However, the relative health inequality indices show less income inequality in the general population than in the managed care insured subpopulation.

There are no strictly comparable HI_{wv} results for other countries, but some estimates are available for the adult population in a number of OECD countries [4]. The HI_{wv} estimates for all doctor visits for three of these countries are shown in Table 2 along with the US estimate for the overall adult population. The US HI_{wv} index for adults is somewhat lower than the index for the entire non-institutionalized population, but both are quite large in comparison with Canada, the UK, and Germany. In comparison, the HI_{wv} index for those with traditional care insurance is closer to, but still more pro-rich than for the three OECD countries.

When we examine the sample means by income quintile in Table 3, it is clear that the elderly are a much larger proportion of the traditional care users than of the managed care users and correspondingly, there are proportionally more children and working age adults

among the managed care users. If children, for example, tended to be systematically reported as being in poorer health than they actually are, it would lead to an overestimate of children's health care needs. This would lead to the conclusion that the MCO plans under provide if they supply the smaller amount of care required for the children's actual relatively good health state rather than the larger amount of need for care erroneously suggested by the relatively poorer reported health status. However, in principle, this should be taken care of by the age-gender standardization. The exception would be if only the children of only the poor have their health status under-reported (or only the children of only the rich have their health status over-reported). This may be possible, but we are not aware of any studies that suggest such differential underreporting for any of the age-gender-income variables. Another possible explanation would be that the out-of-pocket payments associated with MCOs may be particularly burdensome for low-income patients and as a result, these patients self-limit the amount of their treatment for financial reasons. This does not appear to the case. Table 3 shows that the out-of-pocket expenditures for managed care patients are well below those with traditional care.

We consider the "natural" age division in the US in the provision of health insurance by examining the need-only adjusted health inequity indices for the sub-populations by age. As with the total insured results, there continues to be a pro-rich bias in the managed care plan for doctor visits in the under sixty-five age group. For hospital nights, the pro-poor bias is carried over and becomes more pronounced for those under age sixty-five in the FFS group and those sixty-five or older in the MCO group, while a pro-rich index is observed for the under sixty-five MCO population and the over sixty-five FFS group. There is no

obvious bias in hospital nights for the FFS group over age sixty-five. Examining the index for total expenditures by age and type of coverage, we see that the positive index for the MCO group becomes more pro-rich for the under sixty-five sub-group, maintains a pro-rich bias regardless of age in FFS, and becomes negative for the older MCO population.

Finally, when estimating the indices for the age subpopulations, we introduce an education variable (education is divided into three categories: less than high school education, high school education, and more than high school education) in addition to the three regional and private insurance dummy variables. These variables are included for the total MCO and FFS populations to adjust for any advantage that level of education may bring to a user of health care. When we adjust for private insurance, residential location by region, and education by age group for doctors visits, more than half of the pro-rich bias that is observed in the under sixty-five MCO population for hospital nights is removed, and a significant pro-rich bias remains unexplained. Though not statistically significant, the indices for the older populations change sign and the younger FFS population sees the pro-wealthy index approaching zero, indicating no bias. For hospital nights, adjusting for private insurance, education, and region results in the elimination of a statistically significant pro-poor bias in the FFS under sixty-five population (though the estimated index maintains only a slightly reduced pro-poor bias). As with the total population, total expenditures are not a statistically significant source of inequity in the provisioning of health care as measured by medical expenses for any of the age groups in either type of plan. Although not statistically significant, it is interesting to note the change in the magnitude of the inequity within the MCO and FFS sub-groups as additional factors are

included in the estimation. Specifically, some of the pro-rich bias in the under sixty-five group is accounted for and the older MCO group has an index that is more pro-poor as compared with the index that is estimated when only need is taken into account. In the FFS sub-groups, we see a switch from pro-rich to pro-poor for the under sixty-five population and a decrease in the pro-poor bias for the older FFS group.

Discussion of Results

The results suggest that neither the presence of private insurance nor the region of residence play a decisive role in understanding the much larger pro-rich bias of the MCOs for either the total insured population or the age sub-groups. This suggests that the privately insured patient gets some degree of preferential treatment, and that region may make some difference in access to care, but neither effect is particularly effective in explaining the difference in inequality between the MCO and FFS plans. Furthermore, introducing level of education has little effect on the results.

This leaves us with the consideration of more speculative explanations. It may be that the "cream skimming" phenomena play some role here. If MCOs, which are more recent and more rapidly growing than FFS plans, are able to attract the relatively healthy individuals to switch from their FFS plans, that would certainly account for some of the difference in the overall level of service provision. Those with pre-existing health problems may be more

likely to stay with their current care providers, while the younger, more healthy segment of the population is more willing to go with the less expensive MCO. If the MCOs are particularly cautious about attracting low-income patients, with their generally poorer health, they may either directly or indirectly tend to take individuals whose health status is actually better than reported, although frankly, it is not clear what such a mechanism might be.

It is also possible that there is simply a more substantial problem of discrimination against the poor in MCOs than in FFS because of the different financial incentives in the two types of plans. If caregivers are uncomfortable providing treatment for low-income patients, in the managed care system there is no financial incentive to nevertheless press ahead with the provision of care. Traditional caregivers may be just as loath to treat their low-income patients, but since they will receive more compensation if they provide more care, they go ahead with the treatment anyway.

An alternative explanation would be that those with higher incomes are more successful in working the system to obtain the higher level of care they want, whereas the poor have less of a practical understanding in maneuvering through the system. The higher income patients may be better informed about treatment options and possibilities and thus are more likely to insist on medical care that the managed care providers would prefer not to provide on cost and efficacy grounds. The quintile distributions in Table 1 show much of the pro-rich inequity concentrated in the top income quintile, which supports the idea of an elite group accustomed to getting what they want, applying their acquisitive skills to health care

as well. With traditional care there is less incentive to hold costs down, so the ability to aggressively pursue additional treatment is less important, since the care providers already have a financial incentive to provide full and even excessive care to all of their patients. At a quite subjective level, these last two explanations seem to be the most likely, although certainly further research is needed to clarify the issue. The magnitude of the differential pro-rich bias of managed care compared to traditional care indicates that whatever the explanation is, it reflects a substantial difference between the two systems of care provision. It may well be that the differences between the two systems lead MCOs to discriminate against their low income patients, while providing more generous care only to their well-informed and demanding patients in the upper income quintile. The financial incentive in the traditional care system is to err on the side of overprovision of care, inducing patients to consume more care than they otherwise might. To the extent that demand inducement exists, it may be easier to accomplish with lower income patients, who may not take as active a part in their treatment decisions. Upper income patients, who know what they want, will certainly press to have their needs met, but since the incentive under fee for service is to meet everyone's needs, the higher degree of sophistication of the upper income patients may actually have the effect at times of moderating induced demand for unnecessary services. Unfortunately there is not much evidence to support these conjectures, so while we can conclude that there is strong evidence for the existence of a large relatively pro-rich bias in the provision of medical care by managed care providers compared to traditional care providers, the explanation for this bias is not anywhere near as definite.

References

1. Seidler, E.P. A comparison of access to health care for the black and white populations in the United States over the past twenty-five years. *Dissertation Abstracts International* 2001; **62**: 692.
2. Taylor, A.K., Beauregard, K.M. et al. Who belongs to HMO's: A comparison of fee-for-service versus HMO enrollees. *Med Car Res Rev* 1995; **52:**389-406.
3. van Doorslaer, E., Wagstaff, A. et al. Equity in the delivery of health care in Europe and the U.S. *J Health Econ* 2000; **19**:553-583.
4. van Doorslaer, E., Koolman, X., Puffer, F. Equity in the use of physician visits in OECD countries: has equal treatment for equal need been achieved? *Measuring Up: Improving health system performance in OECD countries*, OECD, Paris, France, 2002.
5. Wagstaff, A., van Doorslaer, E., Paci, P. On the measurement of horizontal inequity in the delivery of health care. *J Health Econ* 1991; **10**:169 – 205.
6. Manning, W.G. et al. Health insurance and the demand for medical care: evidence from a randomized experiment. *American Economic Review* 1987; **77**:251 – 277.
7. Duan, N., Manning, W.G., et al. Choosing between the sample-selection model and the multi-part model. *Journal of Business and Economic Statistics* 1984; **2**:283 – 289.
8. Skinner, C.J., et al. *Analysis of Complex Surveys*, John Wiley and Sons: New York, 1989.
9. Banthin, J.S., Taylor, A.K. HMO enrollment in the United States: estimates based on household reports: 1996. Rockville, MD: Agency for Healthcare Research and Quality; 2001. MEPS Research Findings No. 15. AHRQ Pub. No. 01-0014.

10. Bohmer, R. Note on Managed Care. *From the Field: Inside Health Care*, Harvard Business School Publishing: Cambridge, MA 2001.
11. Grembowski, D., Cook, K., et al. Managed care and the physician referral. *Med Car Res Rev* 1998; **55**:3-31.
12. USA Today Website. http://www.USAtoday.com/life/health/hcare [25 April 2000].
13. Kowalczyk, L. HMOs eyeing surcharge for high end care. *The Boston Globe*, A1, August 28, 2001. Related editorial: Health care without tiers. *The Boston Globe*, August 29, 2001.
14. Kowalczyk, L. Blue Cross to offer tiered plan next year: joins Tufts Health Plan in levying surcharge on teaching hospital visits. *The Boston Globe*, C1, December 4, 2001.
15. Household Component Full Year Files. February 2002. Agency for Healthcare Research and Quality, Rockville, MD. http://www.meps.ahrq.gov/Data_Pub/hc_FYData96.htm.
16. Escarce, J. and Puffer. F. Black-white differences in the use of medical care by the elderly: a contemporary analysis. *Racial and Ethnic Differences in the Health of Older Americans,* National Research Council, National Academy Press: Washington, DC, 1997.

Table 1: Resource Use by Income Quintile

Actual Use

Resource Use	**Physician Visits**		**Hospital Nights**		**Total Expenditures**	
Subpopulation	**MCO**	**FFS**	**MCO**	**FFS**	**MCO**	**FFS**
Income Quintile						
Lowest 20%	3.59	4.66	0.62	1.45	2142	3197
20-40%	3.55	4.06	0.37	0.83	1699	2686
40-60%	3.65	3.84	0.44	0.62	1684	2153
60-80%	3.88	3.86	0.21	0.59	1605	2364
Highest 20%	4.20	4.02	0.38	0.38	2272	2219
Mean	3.82	4.10	0.38	0.80	1880	2540
Q1/Q5	0.85	1.16	1.63	3.82	0.94	1.44
Q1-Q5	-0.61	0.64	0.24	1.07	-130	978

Standardized for Health Status, Age, and Gender

Resource Use	**Physician Visits**		**Hospital Nights**		**Total Expenditures**	
Subpopulation	**MCO**	**FFS**	**MCO**	**FFS**	**MCO**	**FFS**
Income Quintile						
Lowest 20%	2.91	3.93	0.41	1.10	1640	2483
20-40%	3.34	3.82	0.30	0.70	1563	2441
40-60%	3.78	4.11	0.46	0.75	1771	2431
60-80%	4.07	4.35	0.25	0.78	1718	2704
Highest 20%	4.43	4.50	0.48	1.00	2455	2655
Mean	3.82	4.10	0.38	0.80	1880	2540
Q1/Q5	0.66	0.87	0.85	1.10	0.67	0.94
Q1-Q5	-1.52	-0.57	-0.07	0.10	-815	-172

Table 2: HI_{wv} Indices

Physician Visits

	Estimation Adjusted for:							
	Need		Need, Private Insurance, and Region		Need, Private Insurance, Region and Education		Need (Adults Only)	
Index	**HI_{WV}**	**t**	**HI_{WV}**	**t**	**HI_{WV}**	**t**	**HI_{WV}**	**t**
Subpopulation								
MCO	0.080	6.28	0.066	5.08				
FFS	0.026	2.00	0.018	1.38				
MCO (under 65)	0.090	6.59			0.044	2.34		
MCO (65 & older)	0.008	0.28			-0.012	-0.43		
FFS (under 65)	0.031	1.79			0.003	0.10		
FFS (65 & older)	-0.026	-0.54			0.005	0.25		
All USA[a]	0.068	7.21	0.036	3.76			0.055	5.49
Canada[b]							0.011	1.87
UK[b]							0.010	0.91
Germany[b]							0.010	1.32

Table 2 (continued)

Hospital Nights

	Estimation Adjusted for:					
	Need		Need, Private Insurance, and Region		Need, Private Insurance, Region and Education	
Index	**HI_{WV}**	**t**	**HI_{WV}**	**t**	**HI_{WV}**	**t**
Subpopulation						
MCO	-0.015	-0.22	0.032	0.46		
FFS	-0.111	-2.08	-0.099	-1.89		
MCO (under 65)	0.027	0.33			0.095	1.13
MCO (65 & older)	-0.152	-1.38			-0.132	-1.26
FFS (under 65)	-0.215	-2.26			-0.172	-1.85
FFS (65 & older)	0.013	0.26			0.013	0.27
All USA[a]	-0.081	-1.82				

Total Expenditures

	Estimation Adjusted for:					
	Need		Need, Private Insurance, and Region		Need, Private Insurance, Region and Education	
Index	**HI_{WV}**	**t**	**HI_{WV}**	**t**	**HI_{WV}**	**t**
Subpopulation						
MCO	0.072	1.33	0.055	1.00		
FFS	0.020	0.76	-0.001	-0.05		
MCO (under 65)	0.099	1.78			0.077	1.39
MCO (65 & older)	-0.047	-0.71			-0.052	-0.80
FFS (under 65)	0.013	0.31			-0.022	-0.53
FFS (65 & older)	0.033	1.04			0.024	0.76
All USA[a]	0.064	2.38				

[a] includes insured and uninsured
[b] [4]

Table 3

Sample Means by Income Quintile

		Income Quintile					
Variable	***Subpopulation***	Lowest 20%	20-40%	40-60%	60-80%	Highest 20%	Mean
Any Private Insurance	MCO	0.48	0.87	0.97	0.98	0.98	0.892
	FFS	0.43	0.77	0.90	0.93	0.95	0.788
Any Public Insurance	MCO	0.66	0.26	0.11	0.08	0.08	0.196
	FFS	0.67	0.40	0.24	0.20	0.19	0.347
Uninsured for all of 1996		0.21	0.18	0.11	0.07	0.05	0.122
Age	MCO	27	30	30	33	37	32
	FFS	37	40	37	39	42	39
Children under 16	MCO	0.42	0.34	0.31	0.24	0.17	0.276
	FFS	0.33	0.27	0.24	0.20	0.14	0.239
Adults 16 to 64	MCO	0.48	0.56	0.63	0.72	0.79	0.661
	FFS	0.42	0.45	0.57	0.64	0.71	0.551
Adults 65 & older	MCO	0.11	0.10	0.06	0.04	0.04	0.063
	FFS	0.25	0.28	0.19	0.17	0.16	0.210
Hispanic	MCO	0.19	0.13	0.11	0.07	0.04	0.097
	FFS	0.19	0.10	0.06	0.06	0.05	0.088
Black Non-Hispanic	MCO	0.26	0.16	0.11	0.10	0.08	0.128
	FFS	0.23	0.13	0.08	0.06	0.05	0.112
Female	MCO	0.55	0.55	0.50	0.51	0.49	0.520
	FFS	0.59	0.54	0.50	0.50	0.47	0.520
Health Excellent	MCO	0.30	0.36	0.40	0.40	0.42	0.390
	FFS	0.24	0.30	0.37	0.38	0.44	0.340
Health Good	MCO	0.27	0.23	0.21	0.19	0.19	0.210
	FFS	0.25	0.23	0.20	0.19	0.17	0.210
Health Fair	MCO	0.11	0.07	0.05	0.05	0.04	0.060
	FFS	0.17	0.09	0.07	0.06	0.05	0.090
Health Poor	MCO	0.06	0.03	0.02	0.01	0.01	0.020
	FFS	0.07	0.05	0.03	0.02	0.01	0.040

Sample Means by Income Quintile (continued)

		Income Quintile					
Variable	***Subpopulation***	Lowest 20%	20-40%	40-60%	60-80%	Highest 20%	Mean
Chronic Limitation	MCO	0.20	0.16	0.15	0.14	0.13	0.150
	FFS	0.32	0.25	0.20	0.21	0.16	0.230
Income per	MCO	5951	13284	19575	27651	46965	25517
Equivalent Adult	FFS	6041	12948	19604	27681	48268	22275
Any Doctor	MCO	0.72	0.73	0.75	0.79	0.80	0.744
Visits	FFS	0.73	0.72	0.74	0.74	0.74	0.713
Any Hospital	MCO	0.09	0.08	0.06	0.05	0.05	0.029
Nights	FFS	0.13	0.11	0.07	0.06	0.05	0.086
Any Health	MCO	0.86	0.88	0.87	0.92	0.94	0.899
Expenditures	FFS	0.84	0.86	0.88	0.90	0.90	0.874
Out of pocket	MCO	236	235	260	318	395	301
expenditures	FFS	311	466	402	501	533	439
Northeast Region	MCO	0.19	0.16	0.20	0.22	0.24	0.210
	FFS	0.18	0.19	0.16	0.19	0.23	0.190
Midwest Region	MCO	0.17	0.24	0.20	0.22	0.21	0.210
	FFS	0.20	0.26	0.31	0.30	0.26	0.260
South Region	MCO	0.31	0.33	0.30	0.34	0.26	0.300
	FFS	0.40	0.37	0.35	0.34	0.35	0.360
West Region	MCO	0.31	0.26	0.29	0.22	0.29	0.270
	FFS	0.19	0.17	0.17	0.16	0.15	0.170