IESE Business School SP-SP
University of Navarra

Working Paper

WP No 596
July, 2005

MANAGED CARE AND THE SAFETY NET: MORE PAIN FOR THE UNINSURED?

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Abstract

The introduction of managed care has dramatically changed the US health care market. However, most of the literature has focused on analyzing the performance of managed care relative to other types of health insurance, while research focusing on its impact on the uninsured has been minimal. This paper contributes to fill this gap and analyses the impact of managed care on access to care and quality of care for the uninsured. We expand Frank and Salkever's (1991) model to analyze hospitals' decision to provide charity care and use a probit model to test the results empirically. We find that managed care has negatively affected both aspects of the uninsured's health, by increasing the probability of closure of the safety net hospitals and the services most used by the uninsured, and by negatively affecting the quality of government hospitals. Therefore the impact of managed care goes beyond its effect on its enrollees and on efficiency. In fact, by increasing price competition and reducing hospital revenues, managed care penetration has affected the overall health care market.

These results have important policy implications. With the introduction of managed care, the health gap between socioeconomic groups will widen and more public subsidies will be needed in order to guarantee the provision of basic health care to the growing uninsured population. The results also bring a new perspective on managed care. Its impact on American health should be analyzed beyond its efficiency implications and more research should be done into its effects on the overall health care market.

Keywords: managed care, health insurance, uninsured, health economics, safety net

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Introduction

In the last 25 years, the US health insurance market has experienced a dramatic change, with the diffusion of managed care. By 1982, the number of Americans with health insurance that had enrolled in some form of managed care plan was less than 10% (American Association of Health Plans). By the year 2000 this number had risen to over 80% (trends and indicators in the changing health care marketplace, 2002).

The impact of the managed care boom has been subject to close scrutiny in recent years. Most of the literature in the field of health economics has concentrated either on analyzing the role of managed care in bringing efficiency gains to the health care market or on studying the impact of managed care on the utilization and the quality of care for its enrollees. In this respect, Levit et al. (1998) and Zwanzinger and Melnick (1996) point out that managed care is responsible for a large part of the slowdown in expenditure growth in health care. Baker and Brown (1997) find that managed care reduces the number of mammography facilities in the US, increasing the utilization per machine and avoiding duplications. Mas and Seinfeld (2000) show that, by reducing technology adoption, managed care can lead to an important reduction in health care costs. Regarding the effect of managed care on its enrollees, Luft and Miller (1997) find mixed results for managed care performance on the quality of care for those patients with managed care insurance.

However, most of the literature has focused on the performance of managed care relative to other types of health insurance. Research to date analyzing the impact of managed care penetration on those not insured under managed care contracts has been minimal. Currie and Fahr (2000) show that in California higher managed care penetration rates lead to an increase in the share of uninsured patients treated by public hospitals at the expense of losing the more profitable Medicaid patients to private hospitals. Richardson (2000) finds a negative impact of managed care on access to care for the poor by observing how the provision of emergency room services and the number of hospitals in poor areas changes with managed care penetration.

This paper contributes to fill the gap in the literature by analyzing the impact of the increase in managed care penetration on the provision of health to one demographic group without managed care insurance that is of particular concern: the poor uninsured. In the first place, these individuals cannot afford to pay for health insurance or for the health care they may need. Moreover, the uninsured are reported to be less likely to receive health care

(American College of Physicians-American Society of Internal Medicine, 2000) and to exhibit worse health outcomes (Meara, 1998; Doorslaer et al., 1997; Ettner, 1996).

There are currently 45 million uninsured people in the U.S. (U.S. Census Bureau). Approximately two-thirds of them live in families whose income is below 200 percent of the poverty line (McBride, 1997). The United States has always relied on an institutional safety net –comprised largely of government, teaching hospitals and hospitals located in poor areas– to meet at least the basic health care needs of this distressed population. In the past, hospitals had been able to finance the social mission of providing charity care through a complex system of cross-subsidies, where privately insured patients were charged higher prices to cover indigent care costs (Aaron, 1991,[1] Cutler, 1995[2]). However, in the last twenty years, with the introduction of managed care, the US health care market has undergone a substantial change. Managed care penetration can affect the whole health care marketplace by changing physicians' practice patterns (Baker and Shankarkumar, 1997) and the competition in the health care market. Due to their large market shares, managed care organizations have a substantial bargaining power that allows them to demand more cost-effective care and lower fees from hospitals and physicians (Cutler and Barro, 1997), reducing the amount of revenues available to finance uncompensated care costs. The increased price competition imposes a large strain on the safety net hospitals, challenging their financial sustainability and their survival as their ability to cross-subsidize is undermined.

In this paper we test the hypothesis that this increased competition, by reducing hospitals' ability to cross-subsidize charity care, has worsened both access to care and quality of care for the uninsured and has had a negative impact on their health.

Our analysis proceeds in three parts. First, using US data, we analyze the effect of managed care penetration on access to care for the uninsured. For this we focus on those hospitals that have traditionally provided care to a larger share of uninsured patients, namely teaching hospitals, government hospitals and hospitals located in poor areas. Within a given metropolitan area (MSA), we distinguish among four different groups of hospitals. The first includes only the MSA teaching hospitals; the second contains all the government non-teaching hospitals in the MSA; the third contains all the hospitals in poor areas that are non-government and non-teaching; and the last includes all the remaining hospitals. In order to determine the effect of managed care on access to care for the uninsured, we analyze the impact of managed care penetration on the closure of safety net hospitals and on the provision of the services more commonly used by the uninsured. These are: emergency rooms (Stern et al., 1991), obstetrics (Sloan at al., 1986; Fournier and Campbell, 1997), and alcohol and drug treatment centers (Cousineau, 1997). The empirical strategy is to determine to what extent managed care negatively affects the provision of services predominantly used by patients for which the hospital will not receive any reimbursement and to determine if this effect is more pronounced for the safety net hospitals. Our results confirm that market pressures established by managed care negatively affect the access to care of the uninsured by encouraging the closure of hospitals and the termination of services generally used by the indigent. This effect is stronger for hospitals located in poor neighborhoods and for government hospitals.

Second, we use the California Hospital Discharge Data from the Office of Statewide Healthcare Planning and Development (OSHPD) for 1985 and 1995 to determine whether the allocation of charity care patients has changed during the decade of study. We also analyze whether there is a trade-off between quantity of charity care provided and quality of care. Our results confirm the findings of Currie and Fahr (2000) regarding charity

[1] A study by the American Hospital Association calculates that the average paying hospital patient subsidizes charity care by paying a "hidden tax" of 10.6%.

[2] Almost a third of uncompensated care is paid by extra charges to insured patients.

care patients shifting toward government hospitals. The results also seem to point toward the possibility of a trade-off between the number of charity care patients and the quality of care provided. Government hospitals, now receiving a higher proportion of charity care patients, also experience a decline in their quality of care – as measured by the proportion of patients that die after a heart attack.

Finally, we analyze the impact of managed care penetration on health outcomes –as measured by the probability of dying after a heart attack– for the population that traditionally uses safety net hospitals: mainly the uninsured, those living in poor areas, and those using government hospitals (which have been the ones most affected by managed care). Our results indicate that managed care penetration has a negative impact on the health care outcomes of charity care patients and of those who attend government hospitals. Its impact on the health status of those living in poor areas, after controlling for their insurance status and the type of hospital they attend, is negligible.

These results have important policy implications. The number of uninsured Americans has kept increasing, while their access to care and the quality of care they receive has deteriorated. This exacerbates the already existing socioeconomic inequalities in health. On top of this, the fact that charity care patients are concentrating in government hospitals, which in turn are the ones most affected by managed care penetration, suggests that more public subsidies might be needed to guarantee their survival and their ability to provide indigent care.

The rest of the paper is organized as follows. Section 1.2 provides a description of managed care characteristics and trends. Section 1.3 describes the hospitals' provision and financing of charity care. Section 1.4 presents a model that analyzes hospitals' provision of uncompensated care and the quality of care provided in a managed care framework. Section 1.5 describes the methodology and the data used in my empirical analysis. Section 1.6 presents results using US data, Section 1.7 uses California data to analyze the effect of managed care on hospital quality and health outcomes, and Section 1.8 concludes.

1. Managed Care

In the past several years, the health care market in the US has undergone massive changes. The most important has been the shift from traditional insurance to managed care. Today, the overwhelming majority of privately insured persons have some form of managed care plan. Managed care includes a wide variety of health insurance contracts, with health maintenance organizations (HMOs) being the most restrictive ones, followed by independent practice associations (IPAs) and preferred provider organizations (PPOs). In the HMOs, the insurance and provision of health care are fully integrated, doctors are paid a salary and members are only allowed to visit the network providers. In the IPAs, the insured are restricted to a panel of doctors enrolled to provide care. Generally, the IPA withholds a share of the fees as a reserve against high costs and this share is given back to the doctors if costs are kept sufficiently low. The PPO is closer to the traditional fee-for-service system. In PPOs the insured pay little when they use a physician from the network and more when they use other physicians. The number of HMO enrollees has been increasing steadily since 1980 (graph 1.1). In 1980, 9.1 million Americans were enrolled in HMOs; in 1995 they numbered 59.1 and in 1998 there were 78.8 million, with another 89.1 million enrolled in other forms of managed care. The public health plans have also been affected by the managed care boom, with 59 percent and 13 percent of Medicaid and Medicare beneficiaries, respectively, enrolled in managed care (American Association of Health Plans). Meanwhile, the number of enrollees in traditional insurance plans has been

decreasing steadily and in 1997 only 15 percent of the privately insured population was enrolled in employer-sponsored fee-for-service plans.

The growth of managed care has changed the competition in the health care market. In the past, hospitals used to compete on quality. With managed care the competition has shifted to prices. Thanks to their big market shares, managed care organizations have a substantial bargaining power when negotiating with health care providers. This allows them to exert oligopsony power over hospitals and physicians, leading to lower prices and quantities of medical care. Managed care organizations pay prices about 30 percent below those paid by traditional insurers (Cutler and Barro, 1997). This change in competition is affecting the practice patterns and prices in the whole health care market.

There are two main differences between traditional insurance plans and managed care. First, traditional insurers barely monitored utilization, as they allowed providers to decide the treatment and paid them on a fee-for-service basis. Managed care plans generally establish a capitated payment or a fixed salary for physicians and use contractual means to enforce price discipline and utilization control on hospitals and specialists. This arrangement changes providers' incentives, as they no longer make money by the volume of patients treated and services provided, but by decreasing the use and costs of their services. Managed care plans use primary care physicians as "gatekeepers", requiring their previous referral before the enrollees can consult a specialist. Many plans also limit the number of hospital days and require physicians to follow some established guidelines for treating a given condition.

Second, traditional insurance plans allowed patients unlimited access to the providers of their choice. Managed care removes equal choice of providers by establishing a network of approved providers the patient can use. This restriction may be direct, allowing members to see only some selected providers; or indirect, using a co-payment system to encourage the insured to use the services provided by their own network. As the number of managed care enrollees goes up, so does the importance of access to the network, since the hospitals that do not belong to it will not get managed care patients. The importance of the network increases the bargaining power of managed care organizations.

By using their bargaining power to enforce price discipline and utilization control, managed care organizations have been able to achieve important efficiency improvements, reducing utilization (Wells et al., 1992; Yelin et al., 1996) and the growth of health care costs (Levit et al., 1998; Zwanziger and Melnick, 1996; Cutler and McClellan, 1996; Mas and Seinfeld, 2000). However, managed care's effects on equity are not yet fully understood.

2. Health Care for the Uninsured

The number of uninsured has been rising since 1987. In 1987 there were 31.8 million uninsured. In 1998 44 million Americans, or 18 percent of the non-elderly, and in 2003 45 million Americans lacked any regular health insurance coverage. About two-thirds of the uninsured live in families whose income is below 200 percent of the poverty line (McBride, 1997). The proportion of uninsured varies greatly with income. In 1998, 34.7 percent of the population below 200 percent of the poverty line were uninsured, while only 4.6 percent of those with income above 400 percent of the poverty line lacked health insurance (Current Population Survey).

The uninsured are less likely to have a regular source of care, more likely to report that they have not received the needed care and more likely to wait until they are seriously

ill to seek medical care (American College of Physicians-American Society of Internal Medicine, 2000). We should be specially concerned about the poor uninsured, given that they are the most vulnerable citizens because they will not be able to afford any private insurance or pay for their health care.

Because the US lacks universal health coverage, it relies on charitable medical care to serve the uninsured. Most of this charity care is provided by hospitals that serve as providers of last resort. These providers, which organize and deliver a significant level of care to the uninsured and Medicaid patients, constitute the safety net. The system also establishes antidumping[3] rules and requires hospitals that have emergency rooms to supply emergency indigent care in two situations: a life threatening health problem or active labor.

US spending on uncompensated care[4] has increased substantially during the past years, growing almost 50% from 1983 to 1995 (Table 1.1). So has the burden of uncompensated care for the hospitals, which has gone from 5.2% of hospitals' total expenses in 1983 to 6.1% in 1995. Hospitals have two sources to finance care of the poor: public and private funding. Public financing can be federal, state or local, but most of it comes from Medicare and Medicaid Disproportionate Share (DSH) Adjustments. Medicare DSH was established in 1986 to compensate hospitals for treating a disproportionately large number of Medicaid patients. In 1997 these payments reached $4.8 billion. 93% of them were for large urban hospitals and 65% went to teaching hospitals. Medicaid DSH was established in 1981 to compensate hospitals with a large share of indigent patients who were not elegible for Medicaid.

Private funding includes direct payments from patients as well as a complicated system of cross-subsidies. Hospitals used to raise prices for privately insured patients to cover the costs of providing care to the uninsured.

With the rising number of uninsured, charity care has become an important element to take into account when analyzing the American health care market. In 1995, hospitals provided $17.5 billion in uncompensated care (Table 1.1). However, the distribution of uncompensated care varies greatly among hospital types and location. The amount of charity care provided by a hospital has two components: the demand side and the supply side.

Demand: Distance to the hospital is an important determinant of hospital choice (Burgess and DeFiore, 1994; Currie and Reagan, 1998). Hence, a hospital located in an area with a high proportion of uninsured is more likely to receive uninsured patients that cannot be turned down. Therefore, the demographic composition of the local population is an important determinant of the demand for uncompensated care that the hospital may face.

Supply: the hospital's willingness to provide uncompensated care may differ depending on its ownership. For instance, not-for-profit and government hospitals may be more willing to provide this kind of community service than for-profit ones. Such a mission may be reflected in the services and technologies that the hospital may offer (a substantial number of poor and uninsured use emergency rooms to receive medical care and obstetric services are also commonly used by uninsured) as well as in the location of the hospital (poor areas versus rich areas). 28.7% of teaching hospitals, 21.1% of not-for-profit hospitals and 20.4% of government hospitals are located in poor areas, while only 15.2% of for-profit ones are encountered in poor neighborhoods. Table 1.2a shows that the distribution of uncompensated care varies greatly among hospital types. Major teaching hospitals and

[3] Dumping occurs when a hospital transfers an emergency patient to another or simply refuses any treatment based on the patient's inability to pay.
[4] Uncompensated care includes bad debt and charity care provided by the hospital.

government hospitals have the largest burden, delivering a share of the uncompensated care that is much higher than their corresponding market share. Major teaching hospitals represent only 8% of the market but they provide about 30% of uncompensated care. Government hospitals are in a similar situation, providing almost 40 percent of the overall uncompensated care, while they account for only 25 percent of the American health care market. Table 1.2b indicates that these hospitals that have a higher burden of charity care are also the ones that provide care to a higher proportion of Medicaid patients.

3. Impact of Managed Care on the Hospitals' Provision of Charity Care

In the absence of universal coverage, the safety net hospitals serve as last resort providers of medical care for many of the nation's uninsured. In the previous environment, there were public and private supports that allowed hospitals to finance the charity care they provided. This delicate net of cross-subsidies is threatened by the introduction of managed care. In this new competitive market, managed care organizations only want to pay a "reasonable" price for the services they consider necessary for the care of their insurers, presenting a challenge for the future financial viability and survival of historical providers of charity care.

In this section we present a framework that analyzes a hospital's provision of charity care and the quality of care provided in a managed care environment. We adapt Frank and Salkever's (1991) model to a managed care environment and introduce the possibility of a trade-off between quality and the amount of charity care provided.

A hospital *h* has the following utility function: $U[\pi(A,q,X), Z_m(A), Y_m(q)]$ where π corresponds to profits, *A* refers to charity care, *q* to quality and *X* to hospital characteristics such as size or location. Different hospitals may have different reasons to provide charity care. For instance, they may care about the indigent population and extract some utility from providing care to the uninsured. This corresponds to what Frank and Salkever (1991) call a "purely altruistic" model. In this kind of framework $Z_m(A)=A$. In general, this willingness to provide charity care may depend on the hospital's mission, with public and teaching hospitals being more willing to provide this community service than the for-profit ones. Another reason why hospitals may want to provide free care for the uninsured is because this may increase their reputation in the community or provide them with more donations or better fiscal treatment[5]. In this case hospitals may compete with the rest of the providers in the market for charity care and $Z_m(A)$ will also depend on the amount of charity care provided by their rivals. This is what Frank and Salkever (1991) call an "impure altruism" model. Similar reasoning can be applied to quality. Some hospitals may obtain utility directly from providing good quality care to their patients and have $Y_m(q)=q$. This again may vary with the hospital ownership. Other hospitals may look at quality as a way to improve their reputation and thus, to increase their profits. Hence both functions *Z* and *Y* depend on the hospital's mission *m*.

In a managed care context, profits for a hospital *h* that provides quality *q* and an amount of charity care *A* are given by:

$$\pi_h = P_{mc}(Q_{mc}, A, q, X)Q_{mc} + P_{ti}(Q_{ti}, A, q, X)Q_{ti} + rA + D(A) - C\left[(Q_{mc}+Q_{ti}+A)q, X\right]$$

[5] Fournier and Campbell (1997) find evidence showing that hospitals in Florida that provide greater amounts of care for the poor are systematically awarded licenses for certificate-of-need approval.

where P_{mc} corresponds to the price that the hospital receives for its managed care patients while P_{ti} is the price charged to patients with a traditional insurance contract. Both prices are a function of A, as hospitals need some cost-shifting in order to be able to pay for their uncompensated care. r is the payment the hospital receives for its charity care patients. It includes the per-patient transfers from Medicaid and Medicare DSH programs. Q_{mc} , Q_{ti} and A are the quantity of patients with managed care contracts, traditional insurance contracts and uninsured, respectively. C is a well-behaved twice-differentiable cost function. D is the donations received by the hospital.

A hospital solves the following optimization problem:

$$\underset{A,q}{Max} \quad U[\pi(A,q,X), Z_m(A), Y_m(q)]$$
$$s.t. \pi \geq \pi_l$$

where π_l is a lower bound on hospital profits and U is increasing in all its arguments.

The first order condition with respect to charity care is given by the following implicit reaction function:

$$qC_A = \frac{\partial P_{mc}}{\partial A} Q_{mc} + \frac{\partial P_{ti}}{\partial A} Q_{ti} + r + \frac{\partial D}{\partial A} + \frac{U_2}{U_1 + \lambda} \frac{\partial Z_m}{\partial A} \qquad (\textit{equation } 1.1)$$

where

$$C_A = \frac{\partial C}{\partial A}; U_1 = \frac{\partial U}{\partial \pi}; U_2 = \frac{\partial U}{\partial Z_m}$$

and λ is the Lagrange multiplier.

Assuming that C_{AA} is non-negative, equation 1.1 can be rewritten as:

$$A = f\left[\left(\frac{\partial P_{mc}}{\partial A} Q_{mc} + \frac{\partial P_{ti}}{\partial A} Q_{ti} + r + \frac{\partial D}{\partial A} + \frac{U_2}{U_1 + \lambda} \frac{\partial Z_m}{\partial A}\right)\frac{1}{q}, X\right] \qquad (\textit{equation } 1.2)$$

where f is increasing in its first argument. Equation 1.2 shows that there is a trade-off between the amount of charity care provided and the quality of medical care. In this competitive environment, hospitals are paid a lower price per treatment, which generally has been previously negotiated with the managed care organization. If the hospitals increase the quality of care provided, with the corresponding increase in costs, they will have less excess revenues to finance their charity care.

dZ_m/dA depends on the hospital's mission. If the hospital obtains utility directly from the charity care provided, as some models suggest that teaching, not-for-profit and public hospitals do, $dZ_m/dA=1$. On the other hand, some models suggest that for-profit hospitals care only about profits. In this case, $dZ_m/dA=0$. Under these two extreme assumptions, not-for-profits, public and teaching hospitals would provide more charity care than for-profit ones. The difference would be given by the term $U_2/(U_1+\lambda)$.

Managed care can reduce hospitals' provision of charity care in two ways: First, for the hospitals that belong to the network, using their oligopsony power, managed care organizations are able to negotiate better prices and lower quantities of care with the hospitals. Hence, $P_{mc}<P_{ti}$. This lower price for the insured reduces the hospital's excess revenues available to finance charity care. Moreover, in the traditional environment,

hospitals were already cost-shifting from insured patients to uninsured, charging higher prices to the former in order to pay for the latter. Now, managed care organizations only want to pay "reasonable" prices for the care considered necessary for their patients, making it very hard for the hospitals to cross-subsidize indigent care and reducing their ability to charge higher prices to the insured when their amount of charity care patients goes up:

$$\partial P_{mc} / \partial A \leq \partial P_{ti} / \partial A$$

Second, hospitals that do not belong to the network observe how they lose some potential patients that have managed care contracts and are forced to go to their network hospitals. This decrease in the number of insured patients challenges their possibility of survival if the hospitals keep providing the same amount of care for the uninsured. Also, the overall market prices and physician practices are affected by managed care (Baker and Shankarkumar, 1997). Hence, the hospitals that do not belong to the network also suffer a reduction in their prices, which decreases hospitals' revenues and makes cross-subsidization of uncompensated care more difficult.

Moreover, managed care organizations may not be interested in including in their network hospitals that provide a lot of charity care because such hospitals may have to charge higher prices in order to cross-subsidize their uninsured patients. Given that a provider that does not belong to the network will not receive any managed care patients and given the importance of managed care, hospitals may be discouraged from providing uncompensated care in order to have better chances of entering a managed care network.

4. Methods and Data

The model described above suggests that managed care has a negative impact on hospitals' provision of charity care. Managed care organizations exert profound pressures on prices and utilization that threaten to erode the system of cross-subsidies that has enabled hospitals to finance the care they provide to the uninsured.

This financial stress is stronger for hospitals that have traditionally provided care to a larger share of uninsured patients, such as teaching hospitals, government hospitals and hospitals located in poor areas. Teaching and government hospitals have traditionally had a mission of providing care to the indigent. Tables 1.2a and 1.2b show that major teaching hospitals and government hospitals provide care to a disproportionately high share of uninsured and Medicaid patients compared to their market share. Distance to the hospital is an important determinant of hospital choice (Burgess and DeFiore, 1994; Currie and Reagan, 1998). Thus, a hospital located in a poor area with a higher proportion of uninsured patients is more likely to provide charity care.

To determine whether a hospital belongs to a poor neighborhood, we establish a ranking of the average income per capita in all the zip codes for each state in order to determine the level corresponding to the lower thirty-third percentile. Then we compute the average per capita income for the five-mile radius area surrounding the hospital. If it lies below the thirty-third percentile level for the corresponding state, the hospital is considered to be located in a poor neighborhood.

The objective of this study is to determine managed care's impact on the quantity and quality of services provided to the poor in order to ultimately understand the effect of managed care on the health of the uninsured. We therefore analyze whether managed care organizations have more severely affected the hospitals that provide most of the

uncompensated care, mainly teaching hospitals, government hospitals and hospitals located in poor neighborhoods. For each metropolitan statistical area (MSA) we define a maximum of four groups of hospitals: teaching hospitals, non-teaching government hospitals, non-teaching-non-government hospitals located in poor areas and other hospitals. We examine whether managed care has had a stronger impact on the first three groups, as they are the ones that will struggle the most to finance their large number of uncompensated care patients now that managed care has reduced the growth of hospital revenues.

These groups of hospitals are the relevant unit of analysis, as our aim is ultimately to understand the effect of managed care on access to care. If a particular hospital in a poor area closes its emergency room and another hospital opens a new one, there is no large impact on access to care for the poor. However, if we observe a significant termination of services or hospitals in one of the three hospital types traditionally used by the uninsured, their access to care may have worsened. Hence, looking at hospitals in these four categories is the right way to analyze the managed care effect on access to care for the poor. Thus, our relevant observations are 894 groups of hospitals (henceforth, quasi-hospitals) in the 371 US MSAs, with a maximum of four quasi-hospitals per MSA. There are 122 quasi-hospitals containing only the teaching hospitals in the corresponding MSA, 257 including only the non-teaching government hospitals in the MSA, 171 consisting of non-teaching-non-government hospitals located in poor neighborhoods and 344 comprised of other hospitals.

We use the following specification:

$$Y_l = \alpha \Delta HMO * poor_l + \beta \Delta HMO * teaching_l + \delta \Delta HMO * gov + \\ + \phi \Delta HMO + \theta poor + \omega teaching + \rho gov H_l \gamma + D_l \eta + M_l \lambda + \varepsilon_l \qquad \text{(equation 1.3)}$$

where Y_l is the dependent variable; ΔHMO refers to the change in HMO enrollment between 1985 and 1995 in the corresponding MSA; *teaching* is a dummy equal to one for the quasi-hospitals including all the MSA hospitals members of the Council of Teaching Hospitals; *gov* is a dummy variable equal to one if the quasi-hospital contains the non-teaching government hospitals in the MSA; and *poo*r is a dummy variable equal to one if the observation includes the non-teaching-non-government hospitals located in poor areas; *H* refers to the characteristics of the average hospital in the quasi-hospital; *M* corresponds to the market characteristics; and *D* to the demographics of the area considered.

Dependent Variable

To determine the impact of managed care on access to care for the poor, we focus on the change in the number of hospitals in a given market, as well as on the change in the amount of hospital services most commonly used by the uninsured. These services include emergency rooms, obstetrics and inpatient and outpatient care for alcohol and drug dependency. Regarding emergency rooms, for many of the US urban poor, going to the doctor means showing up at a hospital emergency room (Shoor and Hughes, 1993; Stern et al., 1991; Freeman et al. 1990). Moreover, a substantial number of poor uninsured patients use the emergency room for primary care (Freeman and Corey, 1993) and Currie and Reagan (1998) reported that uninsured children are five times more likely than other children to use the emergency room as their regular source of care.

Obstetric units are the other group of services most commonly used by the uninsured. Hospitals are required to accept patients in active labor (Fournier and Campbell, 1997), and about half of the inpatient admissions for charity care patients correspond to obstetrical deliveries and accident cases (Sloan et al., 1986). Finally, the indigent population

is more likely to have alcohol or drug problems (Cousineau, 1997) and, hence, to disproportionately require the use of alcohol and drug treatment centers.

Data on hospital services has been obtained from the AHA Annual Survey for 1985 and 1995. This paper includes a sample of 3862 urban, non-federal acute care hospitals. Long-term and special care facilities such as psychiatric hospitals are excluded, as they attract only a select group of patients. The AHA data also provides information on the hospital address and zip code, as well as on hospital closures between 1985 and 1995.

Table 1.3b provides the summary statistics for these dependent variables, differentiated by market type. Poor areas in 1995 had only 72% of the hospitals existing in 1985, while teaching, government and other quasi-hospitals kept 87%, 82% and 84% of their 1985 hospitals, respectively. A similar tendency can be observed for the services most commonly used by the indigent when seeking medical care. For instance, poor, teaching and government quasi-hospitals had in 1995 only 45%, 57% and 34%, respectively, of the inpatient alcohol and drug centers existing in 1985. The other areas maintained 66% of them.

There is a problem with the AHA data. The survey only asks about the hospital's provision of a certain service or facility; it does not ask how many units the hospital is operating. Hence, this omission will result in an underestimation of the impact of managed care on hospitals' termination of certain services since if, for instance, a hospital has two units of obstetrics and closes one of them, this will not be reflected in the data.

Another aspect that should be taken into account is that we are interested in whether managed care has a greater effect on the provision of services disproportionately used by the poor in poor, government and teaching markets. However, it could also be the case that poor or government markets had initially more inefficient hospitals that have been forced to close or to stop providing certain services by the increase in competition imposed by managed care. Under these circumstances, these markets would lose part of their hospitals and services, but as a result of their inefficiencies and not of their inability to cross-subsidize charity care. In order to see if managed care affects more the services most generally used by the indigent, we will also determine if, with the introduction of managed care, a control group of services is reduced more in poor and teaching groups than in the other ones. The AHA Annual Survey includes several questions regarding the provision of different technologies, but we are interested in general groups of services provided by the hospital (for instance, cardiac intensive care) and not in particular sets of technologies (e.g. open-heart surgery versus angioplasty), since these general services are more comparable with our reference group.

Table 3c reports the summary statistics of the control group variables that include general services offered by the hospitals that are not disproportionately used by the poor. Once again, poor and government markets are the ones with fewer units of services and also those that by 1995 have kept fewer of the services existing in 1985. For instance, only 2 hospitals in poor areas and 1.1 in government quasi-hospitals offered cardiac intensive care in 1985, while 2.8 and 4.4 offered it in teaching and other groups, respectively. Moreover, only 0.5 of the hospitals in poor and government quasi-hospitals kept offering the service in 1995, while 0.8 and 0.6 hospitals in teaching and other markets still offered the service in 1995.

Given the way in which the question is asked in the AHA, if a hospital closes some of its units but is still offering the service, no change will be shown in the data. Hence we may find that managed care has no significantly different effect on poor and teaching markets for the control group, when, in fact, the number of services may be reduced more. In order to rule out this possibility, we will take advantage of the fact that the AHA also

asks about the number of beds assigned to cardiac intensive care, burn care and medical/surgical intensive care. We will also determine if managed care has more greatly reduced the number of beds for these particular services in poor and teaching markets. The summary statistics for the different kinds of beds are reported in Table 1.3c.

Managed Care Enrollment

To account for the effect of managed care on hospitals' provision of charity care, we use the share of the MSA population enrolled in HMOs. Enrollment data on other forms of managed care contracts is not available at the MSA level. However, since HMOs are the most restrictive form of managed care as well as the most widespread one, and given that enrollment in other forms of managed care is positively correlated with HMO enrollment, the results obtained should accurately represent the effect that managed care has on hospitals' provision of charity care.

HMO enrollment at the MSA level for 1985 and 1995 has been obtained from the Area Resource File (ARF). We include the HMO enrollment growth between 1985 and 1995, the growth interacted with poor and teaching dummies and the HMO enrollment in 1985.

There is the possibility that unobservable variables are correlated with both managed care market share and the proportion of uninsured. For instance, it could be the case that HMO enrollment increased more in the MSA where population also grew more. However, the correlation between the change in HMO penetration and population growth is only 0.018 and hence this should not be a problem. Another possible source of endogeneity is that managed care organizations may prefer these areas where the hospital costs are already low. There is also the possibility that unobservable variables are correlated with both managed care market share and the probability of providing certain charity care services. For instance, patients' preferences for health care, or the health status of the population may be important omitted variables. To correct for these two problems we use an instrumental variable (IV) approach. A possible instrument for the change in HMO penetration is the average firm size in the corresponding MSA, as first used by Baker (1997). Since large firms are more likely to offer managed care to their employees, areas with large firms are expected to have more managed care. However, large firms are not correlated with the services provided by the hospitals. The average firm size in the MSA is 29.098 workers. The correlation between average MSA firm size and the change in HMO penetration is 0.12.

Hospital Characteristics

They include the size of the average hospital in the market measured by the number of beds. This data has been obtained from the AHA. In 1985, the average hospital had 269 beds (Table 1.3d).

Market Characteristics

We expect more closures in more competitive markets. In order to account for this competition we include the number of hospitals in the market in 1985. This data has been obtained from the AHA. The behavior of a hospital that is the only one in the market may be different because it may have less competitive pressures. On the other hand, it may be forced to continue to provide certain services and to remain open. We expect this last fact to be especially relevant for government hospitals. If there is only one government hospital

in the MSA it will have various pressures to continue operating and offering basic services such as emergency rooms to the uninsured. In this respect we include a dummy variable equal to one if the hospital is the only one in the market. We also include the interactions of the *solo* dummy with the market type dummies.

Demographics

They include the logarithm of the average family income in the corresponding MSA in 1985, the MSA population in 1985, the percentage of population older than 65 in 1985 and the 1985-95 change in these variables. We also include insurance information such as the percentage of uninsured in the MSA, the percentage of the MSA population with Medicaid and Medicare in 1985 and the change in these variables between 1985 and 1995. Table 1.3d reports the corresponding summary statistics.

The demographic information comes from the 1985 and 1995 Current Population Survey (CPS).

5. Results

Managed Care Impact on Hospitals' Closures and Provision of Services for the Uninsured

The first group of results focuses on two aspects: the number of hospitals in the market and the number of medical services most commonly used by the uninsured. Such services include emergency rooms (Shoor and Hughes, 1993; Stern et al., 1991; Freeman et al. 1990, Currie and Reagan, 1998), obstetrics (Sloan at al., 1986) and alcohol and drug treatment centers (Cousineau, 1997). We are interested in the provision of this specific group of services, because our ultimate goal is to determine the impact of managed care on the health of the uninsured.

Table 1.4 presents the OLS regressions for the effects of managed care on the closure of hospitals and the termination of these specific services as well as the corresponding instrumental variables specification. The coefficients in both cases are consistent. The regressions include the dummies corresponding to the three types of safety net quasi-hospitals as well as their interactions with the change in HMO penetration. These interacted terms will allow me to see if managed care affects more severely these three groups commonly used by the poor uninsured. The baseline corresponds to the groups of hospitals including the MSA non-teaching-non-government hospitals that are located in non-poor neighborhoods. To test for robustness we also run the same regressions using logs for the dependent variable and with and without demographic and market control variables. The results are robust.

With respect to the change in the number of hospitals in the market between 1985, when managed care enrollment was low, and 1995, with high managed care enrollment, Table 1.4 shows a clear negative effect of managed care on poor and government hospital groups. Managed care organizations put intense pressure on prices, reducing hospital revenues and making it very difficult for the hospitals that treat a large number of uninsured patients to survive. The average increase in HMO enrollment between 1985 and 1995 (0.111) would reduce the number of hospitals in 1995, with respect to 1985, by 2.6 percent more in poor neighborhoods than in the rich ones. It would also more greatly reduce the amount of government hospitals by 1.8 percent.

A similar trend can be observed for the number of emergency rooms, obstetric units and inpatient centers for alcohol and drug care. Interestingly, this is not the tendency for outpatient centers. Table 1.4 reports that the average increase in HMO enrollment would reduce the number of emergency rooms in 1995, with respect to 1985, by 2.8 percent more in poor hospital groups and by 7.4 percent more in government quasi-hospitals than in the baseline ones. An 11 percent increase in HMO enrollment will imply 5.8 percent less obstetric units and inpatient centers for alcohol and drug treatment in 1995 relative to 1985 in poor hospitals than in the rich ones. Such increase in HMO penetration would also lead government hospital groups to reduce their inpatient alcohol and drug treatment centers in 1995, relative to 1985, by 1.9 percent more than in the baseline markets. Regarding teaching areas, the effect is not significantly different from zero. HMO enrollment does not have an effect on the number of these services on an outpatient basis. In fact, 46 percent of the hospitals that closed their inpatient center for patients with alcohol and drug problems already had an outpatient center, and 12 percent of them that did not have any, opened new outpatient centers for alcohol and drug treatment (AHA Annual Survey 1985, 1995). Hence, there seems to be a tendency for hospitals to substitute this inpatient care for outpatient services that is not significantly different in teaching, government and poor quasi-hospitals. In order to see if this is the case, we created a variable that accounts for the number of alcohol and drug treatment centers that exist in the market regardless of their inpatient basis and see that the proportion of such centers in 1995 with respect to the ones available in 1985 does not change differently in these three groups of hospitals.

The coefficients corresponding to the government and poor dummies are generally negative but not significant. The government dummy is only significantly negative for the proportional change in obstetrics. The teaching dummy is significantly negative for obstetrics.

Another interesting set of variables is the one that accounts for the fact that markets with only one hospital may react differently as their market pressures are lower. On the other hand, certain types of hospitals, mainly government, may be forced to remain open if they are the only one in the MSA. In this respect we included a dummy that is one if the hospital group contains only one hospital and we also include its interactions with the different hospital types. As expected, the solo dummy is positive. It is significantly different from zero for the proportional change in the number of hospitals in the market, obstetrics and outpatient centers for alcohol and drug treatment. The interaction of this dummy with government hospital groups is positive and significant for the proportional change in emergency rooms, obstetrics and inpatient alcohol and drug centers. This confirms the hypothesis that a government hospital that is the only one in the MSA may face pressures to keep operating – or it may receive more subsidies to remain open.

These results are consistent when defining the dependent variables in log terms instead of in percentage change. The results are also robust to the inclusion of different subsets of explanatory variables.

However, these results may only be reflecting the fact that poor areas have less efficient hospitals that have been forced to shut down or to terminate some of their services with the introduction of managed care. To see if managed care has a differential effect in poor, government and teaching groups of hospitals for the services most commonly used by the poor and that what we observe can be explained by managed care making it more difficult for hospitals to cross-subsidize charity care, we also look at a control group of technologies that are not disproportionately used by the uninsured. The results are presented in Table 1.5.

The first four columns report the change in the number of hospitals providing the service in 1995 and 1985. None of the coefficients corresponding to the interactions between HMO enrollment change and the market type dummies are significant. However, given the way in which the question is asked in the AHA, if a hospital closes some of its units but is still offering the service, no change will be shown in the data. Hence we may find that managed care has no significantly different effect on poor and teaching hospitals from the control group, when, in fact, the number of units of service available has been reduced. In order to see if this is the case, we include the last three columns, which show the change in the number of beds assigned to a particular service between 1985 and 1995. In none of the cases has managed care had a differential impact on poor, government and teaching areas.

Regarding the market characteristics, the dummy for being a market with only one hospital is generally positive. When interacted with government markets, it is only significant and positive for the change in dental services.

Results from Tables 1.4 and 1.5 allow us to conclude that managed care disproportionately forces these hospitals groups with a higher proportion of uninsured to close. This effect is especially strong for government hospital groups and for those including the hospitals located in poor areas. Moreover, the safety net hospitals that remain open target the services traditionally used by the uninsured in order to reduce the charity care they have to provide[6]. This is particularly the case of government hospitals.

These results could have important implications for the access to care of charity care patients. First, a reduction in the number of safety net hospitals, and their higher termination of the services traditionally used by the uninsured, implies that the average patient in the area will have to travel longer distances in order to obtain medical care**.** Traditional health literature finds a negative elasticity of distance on access to care. Currie and Reagan (1998) found that distance to hospital has significant effects on the utilization of preventive care among inner-city black children, for which an additional mile to the hospital was associated with a 3 percent decline in their probability of having a checkup. Goodman et al. (1997) found that medical hospitalizations for patients living more than 30 minutes away from the hospital was 0.85 times the hospitalization of those living in a zip code with a hospital. Following this literature, a reduction in the number of hospitals and services traditionally used by the uninsured and the consequent increase in the distance that patients have to travel to get medical care, implies a worsening in the access to care for the poor uninsured.

An alternative for these patients could be to shift to other kinds of providers. In section 1.7 we use California discharge data in order to determine if charity care patients keep going to the traditional safety net hospitals when using health care. If this is the case, a reduction in the number of safety net hospitals and the services they provide may have a serious negative impact on their access to care.

6. Access to Care and Quality of Care for the Uninsured. An Analysis for California

The previous results suggest that managed care may have had a disproportionate impact on the health of the uninsured by reducing the number of safety net hospitals and terminating the provision of the services most used by the indigent in safety net markets.

[6] It could also be the case that these hospitals that close are very small and they have emergency rooms and obstetric units but they do not have burn care units or intensive care units. However, this fact could still not explain the impact on inpatient alcohol and drug treatment centers, neither does it undermine the fact that there are significantly less emergency rooms or obstetric units now in poor and government hospitals than there were before.

However, in order to determine the extent to which access to care has actually been affected we need to see that uninsured patients do not shift to other markets to obtain charity care. We also require a direct and precise measure of health care quality. Ultimately, given that our main concern is to understand managed care's impact on the health of the indigent, we also want to look at individual data and see if health has become worse for the uninsured.

To further examine these questions we use the California Hospital Discharge Data from the Office of Statewide Healthcare Planning and Development (OSHPD). It contains information on every hospital discharge (approximately 3.6 million per year), including the patient's expected payer (self-pay, charity, Medicare, etc.), the patient's diagnosis and whether the patient died in the hospital. We include as uncompensated care those patients whose expected source of payment is one of the following: self-pay, no charge or medically indigent. Some people consider as charity care those that receive Medicaid (Medi-Cal, in California) as well. We will also look at them separated from the uncompensated care ones and then we will consider them together as well. In 1985, teaching hospitals provided 38% of the MSA total charity care and served 35% of the total MSA Medi-Cal patients. Government-non-teaching hospitals provided 46% of the MSA charity care and 40% of Medi-Cal care, while non-government, non-teaching hospitals located in poor areas provided 7% and 15% of the MSA charity care and Medi-Cal care, respectively.

California is a natural state to study because of its size and data availability. Moreover, the results of Tables 1.4 and 1.5 using only the state of California follow trends similar to the ones obtained using the whole US data, indicating that the behavior of California with respect to the closure of hospitals and services is very similar to that of the rest of the US. However, California differs from the rest of the US in the fact that its managed care penetration has been stronger and is now a more mature phenomenon. However, it is still interesting to understand the impact of HMO penetration on the access and quality of care as well as on the health care outcomes for the uninsured.

Patient Allocation

In order to determine whether charity care patients are shifting to other hospitals, we look at the change between 1985 and 1995 in the proportion of charity care patients that go to each type of hospital market. Table 1.6 reports the OLS regressions and the corresponding IV specifications regarding the change in the proportion of charity care patients, Medi-Cal patients and Medicare patients provided by each quasi-hospital type. The first (OLS) and second (IV) columns in Table 1.6 report the change in the proportion of uncompensated care patients. We can observe that, with the introduction of managed care, the uninsured patients are concentrating in government hospitals. A standard deviation increase of HMO enrollment (0.127) implies that 63 percent more MSA charity care patients would go to government markets in 1995 relative to 1985 than to the baseline hospital. The dummy for poor markets is positive and significant, showing a major concentration of uncompensated care in these markets. The third and fourth columns in Table 1.6 look at the change between 1985 and 1995 in the proportion of MSA Medi-Cal patients served in each market type. There is no significant effect for any of the hospital markets traditionally used by the poor. However, the effect is positive and significant for government hospitals when both Medi-Cal and uninsured patients (Column 5) are considered as charity care. In this case, a one standard deviation increase in HMO enrollment leads to government markets serving 50 percent more MSA charity care patients in 1995 relative to 1985 than to the baseline hospital.

The results in the last two columns suggest that higher managed care enrollment leads to a concentration of charity care patients in government hospitals. As previously

suggested, this result has important policy implications, as government hospitals are now specializing in the provision of charity care and more subsidies may be needed in order to keep them operating to guarantee basic health services to the uninsured population.

Managed Care and the Quality of Medical Care

One of the major obstacles when looking at quality of care is how to measure it. We will use as a quality measure the proportion of patients with acute myocardial infarction (AMI, or heart attack) that die in the hospital. We focus on this particular diagnostic for several reasons. First, because death is a generally accepted quality measure and is a relatively common outcome for heart attacks. Second, AMI cases are not immediately fatal if the patient is rapidly admitted to a hospital and, hence, the hospital intervention is crucial. Finally, this measure of hospital quality has already been used in the literature (McClellan and Staiger, 2000). In order to analyze the evolution of quality during the 1985-1995 period, we look at the proportion of AMI patients that died in 1995 relative to the proportion that died in 1985 for each market type. Due to the technology improvements between 1985 and 1995, for the average hospital, in 1995, the amount of patients dying of AMI is 74 percent the number that died in 1985, and for the baseline hospital it is 72 percent.

Table 1.7 reports the results of using the methodology specified at equation 1.3. The first and second columns include all the urban non-federal general hospitals in California. The third and fourth ones include only the hospitals that have intensive cardiac care units as reported in the AHA Annual Survey for 1985. Column 1 reports the OLS coefficients and column 2 includes the IV instrumental variables results. Both are very consistent. The first two columns of Table 1.7 show that managed care has led to a lower improvement in quality for government and teaching areas relative to the baseline. Compared to the baseline markets, a standard deviation increase of the HMO enrollment would imply 20 percent and 27 percent more AMI patients dying in 1995 relative to 1985 in teaching and government hospital markets, respectively.

The third and fourth columns of Table 1.7 report the results considering only the hospitals with cardiac intensive care units in 1985. In this case, government markets suffer from a worsening in their quality relative to the baseline ones, with a one standard deviation increase in the HMO enrollment leading to 0.22 more AMI patients dying in 1995 relative to 1985 in government and teaching hospitals, respectively.

This negative impact on quality for government hospitals contributes to the deterioration of the health of the uninsured, as they are now concentrating more in government hospitals, which are declining in quality – as measured by the proportion of patients dying of heart attack.

There could be the possibility that, by considering all the patients in the hospitals that die, we are not taking into account the fact that some hospitals may simply discharge their patients earlier and they might die at home instead of at the hospital. In order to address this concern, Table 1.7 also includes the same regressions but now considering only those patients that stayed in the hospital 5 or less days. Columns 1b and 2b include all the hospitals, and columns 3b and 4b contain only those hospitals with cardiac intensive care units in 1985. The coefficients for government hospitals are now smaller, but they are still positive and significant, indicating that government hospitals have worsened their quality between 1985 and 1995. Column 4b presents the instrumental variables result for these hospitals with cardiac intensive care units in 1985. The coefficients imply that a one standard deviation increase in HMO penetration would lead to 0.04 more AMI patients dying in1995 relative to 1985 in government hospitals than in the baseline ones.

These results seem to indicate that there is a trade-off between the number of charity care patients and the quality of care provided. Managed care is having a particularly negative impact on the revenues of government hospitals, which are forced to reduce their cost as well as the number of beds, nurses and inpatient days per patient. Government hospitals have been forced to reduce their quality to be able to continue providing care to their increasing number of charity patients.

Managed Care Impact on the Health of the Uninsured. Who Gets Hurt?

This final set of results uses *patient* data for those individuals that suffered an AMI to determine the impact of managed care on the health outcomes of the uninsured. In this respect, we look at the impact of managed care on the death of charity care patients that suffered heart attacks in 1985 and 1995 respectively. We use the following specification:

$$died = \alpha \Delta HMO * UC * 1995 + \beta \Delta HMO * UC + \chi \Delta HMO * 1995 + \delta \Delta HMO +$$
$$+ \phi 1995 + \varphi UC + Zip\lambda + Dem\eta + \theta MSA + \varepsilon$$

where ΔHMO indicates the change in HMO penetration between 1985 and 1995 in the corresponding MSA, *died* is an outcome dummy equal to 1 if the patient died at the hospital and zero otherwise, *UC* is a dummy equal to one if the patient receives charity care and *1995* is a year dummy that equals one for the year 1995. We also include a set of variables for the patient's Zip code (*Zip*) such as its population, its average family income, the proportion of people with a high school degree or more, the percentage of families in poverty, the percentage of unemployed and the *poor* dummy that equals one if the average per capita income of the Zip code is below the thirty-third percentile level for California. *Dem* includes a set of demographic variables such as age[7], sex and race or ethnicity[8]. All the demographic variables are also interacted with each other to control for the fact that there may be some particular effects for a certain age-sex-race group. Finally, we also include a set of variables at the MSA level. They are HMO penetration, the percentage of population enrolled in Medicare, the percentage enrolled in Medicaid and the percentage of uninsured.

One could estimate this equation with and without fixed effects. The results are very similar and I show the ones without fixed effects in order to interpret the Zip coefficients.

The OSHPD data for California includes 48121 patients with AMI in 1985 and 41104 in 1995. Of them 15.2 percent died in 1985 and 11.8 percent died in 1995.

The probit coefficients are presented in the first column of Table 1.8. In order to control for robustness, we also ran the OLS specification, and we also instrumented HMO penetration by the average firm size of the MSA. The coefficients obtained are very consistent with the probit ones. Finally, we also ran the same specifications including only patients that suffered from a heart attack and stayed in the hospital for 5 days or less. The results are robust and are presented in Table 1.A in the Appendix. The results are consistent and show a positive effect of HMO penetration on the probability of dying of heart attack for the uninsured.

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[7] I only include patients that are 35 or older because there are almost no cases of heart attack for younger patients. I consider nine different age groups (pre-determined by my data): 35-44 years old, 45-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, and 85 or older.

[8] There are five mutually exclusive groups: white, black, Native American/Eskimo/Aleut, Asian/Pacific Islander and Hispanic.

The probit results in Table 1.8 imply that a charity care patient in 1995 from an MSA that had the average HMO penetration of 0.398 would have a probability of dying that would be 3.6 percent higher than for an insured patient. If the HMO enrollment had been one standard deviation (0.121) lower, a charity care patient in 1995 would have had a probability of dying of heart attack that would have been 2 percent higher than for an insured patient. These are considerable numbers if we take into account that the average probability of dying of a heart attack in 1995 is 11.8 percent. The charity care dummy is significantly positive, indicating that the uninsured have a higher probability of dying after a heart attack. Also, the year 1995 dummy is significantly negative, reflecting the improvement in medical technology during the decade under consideration that has allowed the probability of dying of heart attack to decrease from 15.2 percent in 1985 to 11.8 percent in 1995.

These results confirm the fact that HMO penetration has a negative impact on the health of the uninsured. However, the negative impact could be due to their worse access to care or also to the fact that they now go to government hospitals, which in turn have worse quality. Hence, if these are the mechanisms by which managed care leads to worse health outcomes, not only the uninsured, but also those living in poor areas and those going to government hospitals, may have worse health.

Tables 1.4 and 1.5 confirmed that government hospitals and hospitals located in poor areas closed disproportionately more than the baseline ones. These hospitals also had a higher probability of terminating the provision of those services that the uninsured used most, thus having a negative impact on access to care not only for the uninsured but also for those living in poor areas. In order to analyze if managed care also affects the health of people living in poor areas, we use the following specification:

$$died = \alpha \Delta HMO * poor * 1995 + \beta \Delta HMO * poor + \chi \Delta HMO * 1995 + \\ + \delta \Delta HMO + \phi 1995 + \varphi poor + Zip\ \lambda + Dem\ \eta + \theta MSA + \varepsilon$$

where *poor* is a dummy variable equal to one if the patient lives in a poor area (an area whose average income per capita is below the thirty-third percentile level for California). The rest of the variables are defined as before.

The second column in Table 1.8 presents the probit coefficients. The OLS coefficients and the instrumental variables specification, as well as the results including only patients staying in hospital for 5 days or less, are robust and are included in Table 1.B in the Appendix. The probit coefficients imply that a patient that lived in a poor neighborhood in 1995 in an MSA that had an average HMO penetration of 0.398 would have a probability of dying that would be 0.8 percent higher than that of a patient living in a non-poor area. However, if the HMO penetration had been one standard deviation lower instead, a patient living in a poor neighborhood in 1995 would have had almost the same probability of dying (0.1 percent lower) as a patient living in a rich area. The charity care dummy is significantly positive, indicating that the uninsured have a 2.8 percent higher probability of dying after a heart attack than the insured. Again, the year dummy for 1995 is significantly negative, reflecting the medical improvements for heart attack treatment during the decade under consideration.

Another reason for managed care penetration leading to worse health outcomes for the uninsured could be the fact that with the increase in price competition, charity care patients shift to government hospitals (Table 1.6), which in turn have worse quality (Table 1.7). If this is the case, we should expect managed care to affect all the patients that are treated in government hospitals, independently of their insurance status. In order to test if this is the case, we use the following specification:

$$died = \alpha \Delta HMO * gov * 1995 + \beta \Delta HMO * gov + \chi \Delta HMO * 1995 + \\ + \delta \Delta HMO + \phi 1995 + \varphi gov + Zip\ \lambda + Dem\ \eta + \theta MSA + \varepsilon$$

where *gov* corresponds to a dummy variable that is one if the patient goes to a government hospital and zero otherwise. The rest of the variables are defined as previously indicated.

The third column in Table 1.8 presents the probit results. The OLS and instrumental variables specification are included in Table 1.C in the Appendix. The coefficients from the probit imply that a person going to a government hospital in 1995 after suffering a heart attack (and using the average HMO penetration for 1995 in California) had a 2.1 percent higher probability of dying than that of patients going to other kinds of hospitals. A one standard deviation lower HMO penetration would mean only a 0.1 percent higher probability of dying for those going to government hospitals compared to patients that go to other hospital types. This effect remains more severe for the charity care patients.

Hence, managed care penetration has a negative impact on the three groups of patients: those living in poor areas, the uninsured and patients going to government hospitals. However, these groups are not mutually exclusive. It could be the case that we observe a worsening of the health outcomes of those going to government hospitals just because most of them are poor and what we are picking up is the impact of managed care penetration on the health of the poor. A similar argument could be made for the uninsured.

In order to determine which of the groups is affected by managed care penetration, in the final specification we include all the three interactions with managed care penetration. The probit results are presented in the last column of Table 1.8. The coefficients for *HMO*charity*1995, HMO*poor*1995* and *HMO*gov*1995* are all positive and significant. Taking into account all the relevant coefficients, a charity care patient in 1995 in an MSA with the average 1995 HMO penetration has a 3.3 percent higher probability of dying than an insured patient. A patient that goes to a government hospital has a 2.5 percent higher probability of dying than somebody who goes to another type of hospital. However, people that live in poor areas have almost the same probability of dying (0.08 percent lower) as people living in other neighborhoods, after controlling for being uninsured and going to government hospitals.

Hence, regarding the effect of managed care penetration on health outcomes –as measured by their probability of dying after a heart attack– we can conclude that managed care has a negative impact on the health care outcomes of charity care patients and of those that go to government hospitals. Our results also indicate that the impact on the health of those living in poor areas, after controlling for their insurance status and the kind of hospital they go to, is negligible.

However, one should be careful with these results as there might be possible biases coming from the fact that the uninsured population in 1995 might be different from the uninsured population in 1985. Table 1.9 presents some demographic characteristics for all the charity care patients for both years as well as for patients that suffered heart attacks. The differences are quite important if we consider the whole charity care population. The number of females decreased considerably and the age rose significantly between 1985 and 1995. Most of these differences are due to the increase in Medi-Cal coverage, which has increased particularly for young women. However, if we look at the characteristics of the patients that suffered a heart attack, they have remained more stable during the decade under consideration, with the exception of the proportion of Hispanics, which has almost doubled. However, our regression results control for demographic characteristics, including race, so this potential problem should be controlled for.

7. Conclusions

The results of this paper confirm that the impact of managed care goes beyond its effect on its enrollees and on efficiency. In fact, by increasing price competition and reducing hospital revenues, managed care penetration has affected the overall health care market. This paper analyzes the consequences of managed care penetration for the health of the uninsured.

In a country with 45 million uninsured individuals that rely on safety net hospitals for medical care, it is crucial to understand the impact of managed care on these hospitals and on the health outcomes of the uninsured.

Our results show that managed care has increased hospital closures and the termination of those services used most frequently by the uninsured, especially in the case of government hospitals. They also indicate that managed care has had a negative impact on the quality of care provided by government hospitals, negatively affecting the health of the uninsured and of patients treated in public hospitals.

We start by focusing on the impact of managed care penetration on the hospitals traditionally used by charity care patients as well as on the services commonly used by the uninsured such as obstetrics, emergency rooms or centers for alcohol and drug treatment. To do so, we classify hospitals in four categories: the first includes only the MSA teaching hospitals; the second contains all the government non-teaching hospitals in the MSA; the third has all the hospitals in poor areas that are non-government and non-teaching and the last includes all other hospitals. The first three groups include the hospitals more commonly used by the uninsured when seeking medical care. Our results show that the financial pressures introduced by managed care affect the historical providers of charity care more severely than the rest, with government hospitals and hospitals located in poor areas suffering the largest reduction in their revenues per patient. Also, the hospital groups containing government hospitals and those located in poor areas close more hospitals and relatively reduce more the amount of services used disproportionately by the poor. This can seriously threaten the access to care for the uninsured and those living in poor areas, who may now wait longer to seek medical care.

In order to directly determine if managed care has implications for the quality of care received by the uninsured, we use California data. We find that charity care patients are shifting toward government hospitals, which, in turn, experience a decline in the quality of the health care they provide (as measured by the percentage of patients with acute myocardial infarction that die in the hospital).

Finally, using California discharge data we are also able to conclude that managed care has disproportionately worsened the health of the uninsured and of those patients that attend government hospitals. However, this is not the case for those people that live in poor neighborhoods. Our results show that an uninsured patient in 1995 living in an MSA with the average HMO penetration for California urban areas, compared to an insured patient, has a 3.6 percent higher probability of dying after a heart attack than does an insured patient. Also, a patient that goes to a government hospital has a 2.1 percent higher probability of dying of a heart attack than does a patient that is taken to another kind of hospital.

These results have important policy implications. With the introduction of managed care, the health gap between socioeconomic groups will widen, as now not only are the uninsured seeing their access to care reduced, but also they go to hospitals whose quality is declining. Now that their traditional health providers are forced to disproportionately close

more units of the services most commonly used by the poor in order to decrease the charity care they provide, the indigent are turning to government hospitals. More public subsidies will be needed in order to guarantee the provision of basic health care to the growing uninsured population.

These results also bring a new perspective on managed care. Its impact on American health should be analyzed beyond its efficiency implications and more research should be done into its effects on the overall health care market.

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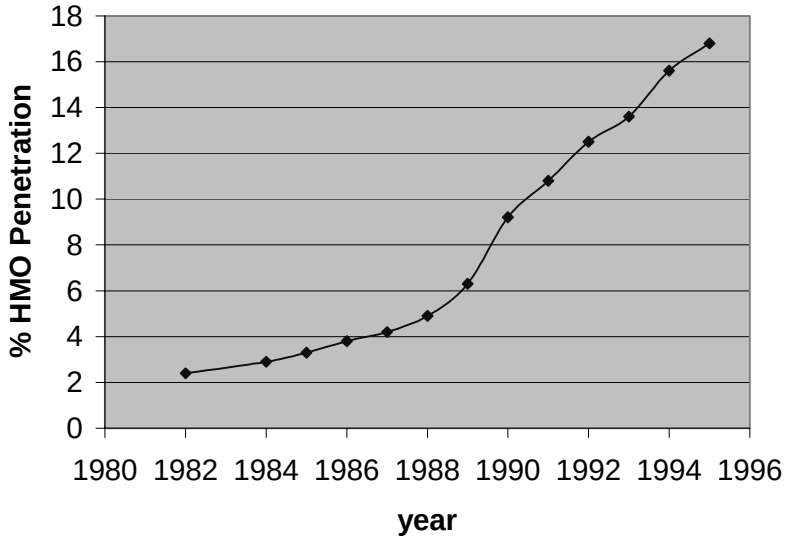
Graph 1.1. Managed Care Penetration



Source: Area Resource File. HMO penetration refers to the percentage of the overall population in the MSA that was enrolled in a managed care contract.

Table 1.1. Trends in Uncompensated Care

Year	UC nominal (billions)	UC real (billions)	UC as percentage expenses
1983	$6.10	$11.70	5.20%
1984	7.4	13.5	6.0
1985	7.6	13.2	5.8
1986	8.9	14.9	6.3
1987	9.5	15	6.2
1988	10.4	15.2	6.2
1989	11.1	15.2	6.0
1990	12.1	15.5	6.0
1991	13.4	16.2	6.0
1992	14.7	16.9	5.9
1993	16	17.6	6.0
1994	16.8	17.7	6.1
1995	17.5	17.5	6.1

Source: American Hospital Association

UC refers to Uncompensated Care. It includes the patients classified as “self pay” and the “bad debt” for the hospital.
UC in real terms is adjusted to 1995 constant dollars using the AHA market basket index.

Table 1.2a. Uncompensated Care by Hospital Type

	UC Share		Mrkt Share		UC/Expenses	
Hospital type	**1985**	**1995**	**1985**	**1995**	**1985**	**1995**
Ownership						
Not-For-Profit	55.60%	55.80%	58.06%	59.64%	4.10%	5.00%
For-Profit	4.10%	5.30%	15.10%	15.35%	3.10%	4.20%
Government	40.30%	38.90%	26.84%	25.01%	11.12%	12.27%
Teaching Status						
Major public teaching	25.20%	26.50%	1.46%	1.52%	8.20%	9.10%
Major private teaching	4.60%	12.40%	5.28%	4.88%	13.60%	14.50%

UC refers to Uncompensated Care, which includes charity care and bad debt.
UC share refers to the percentage of total uncompensated care provided by each hospital type.
MKT share refers to percentage of total hospital beds provided by each hospital group.

Table 1.2b. Uncompensated Care by Hospital Type

	MCD ipd Share		Mrkt Share		MCD ipd/Total ipd	
Hospital type	**1985**	**1995**	**1985**	**1995**	**1985**	**1995**
Ownership						
Not-For-Profit	56.42%	57.18%	58.06%	59.64%	17.88%	18.41%
For-Profit	4.36%	7.33%	15.10%	15.35%	7.38%	15.14%
Government	39.22%	35.49%	26.84%	25.01%	27.68%	32.72%
Teaching Status						
Major public teaching	8.07%	8.65%	1.46%	1.52%	23.58%	35.36%
Major private teaching	14.72%	15.23%	5.28%	4.88%	12.54%	19.56%

Source: American Hospital Association
MCD ipd corresponds to inpatient days of Medicaid patients.
MCD ipd share refers to the proportion of MCD ipd provided by the corresponding hospital category
MCD ipd/ total ipd refers to the percentage of the hospital's inpatient days that correspond to Medicaid patients

Table 1.3a. Summary Statistics. Dependent Variables

	Variable in 1985		Variable 1985-95 Growth	
Variable Name	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
Operating cost per patient in 1985				
Poor	4119.370	1850.91	1.307	0.748
Teaching	5192.514	1509.202	1.316	0.938
Government	4493.91	6564.498	1.795	1.267
Other	3623.47	1010.604	1.367	0.480
Patient Revenues per Patient				
Poor	4207.769	1839.278	1.279	0.757
Teaching	5046.158	1429.029	1.228	0.657
Government	4043.995	4815.326	1.237	2.162
Other	3807.328	1050.741	1.326	0.561
Total Cost per Patient				
Poor	4163.679	1883.578	1.319	0.773
Teaching	5332.712	1592.898	1.318	0.962
Government	4556.316	6685.607	1.808	1.325
Other	3666.942	1028.528	1.371	0.503
Total Revenue per Patient				
Poor	4401.198	1992.235	1.294	0.745
Teaching	5613.862	1611.689	1.283	0.906
Government	4783.184	6765.151	1.194	2.054
Other	3986.038	1101.535	1.349	0.562
Profits per Patient				
Poor	237.519	444.722	-6.403	44.807
Teaching	281.150	774.514	-32.468	359.0784
Government	226.868	751.9993	-22.369	296.894
Other	319.096	333.229	-0.676	50.938
Beds per Patient				
Poor	0.047	0.060	-0.148	0.382
Teaching	0.029	0.010	-0.203	0.275
Government	0.180	0.426	-0.055	0.560
Other	0.035	0.045	-0.114	0.455
Nurses per Patient				
Poor	0.028	0.070	0.335	0.715
Teaching	0.029	0.012	0.125	0.411
Government	0.045	0.086	0.659	1.061
Other	0.023	0.030	0.352	0.919
Inpatient Days per Patient				
Poor	11.498	19.576	-0.202	0.416
Teaching	7.986	2.922	-0.238	0.260
Government	12.374	52.502	-0.074	0.676
Other	8.098	8.715	-0.181	0.456

The relevant unit of observation is the quasi-hospital or hospital group. A given MSA has 4 possible hospital groups: one that contains only the MSA teaching hospitals (***teaching***); the second includes the government hospitals in the MSA that are non-teaching government ***(government)***; the third group contains all the hospitals that are located in poor areas and are non-government and non-teaching (poor); and the fourth group includes the remaining MSA hospitals (***other***). There are 171 groups of hospitals classified as poor, 122 classified as teaching, 257 government and 344 other.

Table 1.3b. Summary Statistics. Dependent Variables

	Variable in 1985		Variable in 95/Variable in 85	
Variable Name	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
# Hospitals				
Poor	3.082	4.793	0.722	0.366
Teaching	3.025	4.175	0.874	0.238
Government	2.564	2.685	0.822	0.307
Other	6.706	10.068	0.832	0.243
# Emergency Rooms				
Poor	2.146	2.846	0.658	0.439
Teaching	2.836	3.784	0.840	0.353
Government	1.416	1.857	0.722	0.466
Other	4.738	6.570	0.798	0.348
# Obstetrics				
Poor	1.392	1.800	0.714	0.515
Teaching	2.459	3.407	0.833	0.310
Government	1.058	1.556	0.708	0.453
Other	3.480	4.798	0.853	0.441
# Inpatient Alcohol&Drug Care Units				
Poor	0.930	1.349	0.450	0.623
Teaching	1.246	2.191	0.565	0.490
Government	0.537	0.824	0.580	0.658
Other	2.241	3.420	0.663	0.653
# Outpatient Alcohol&Drug Care Units				
Poor	0.649	1.076	0.561	0.646
Teaching	1.115	2.272	0.914	0.620
Government	0.339	0.774	0.450	0.573
Other	1.404	2.348	0.844	0.691
# Any Alcohol&Drug Care Units				
Poor	1.041	1.420	0.576	0.655
Teaching	1.533	2.679	0.858	0.513
Government	0.661	1.089	0.607	0.655
Other	2.439	3.830	0.791	0.688

Table 1.3c. Summary Statistics. Dependent Variables. Control Group of Services

Variable Name	Mean	Std. Deviation
HMO Penetration Change * Poor	0.021	0.08
HMO Penetration Change * Teaching	0.028	0.095
HMO Penetration Change * Government	0.029	0.096
Poor	0.191	0.393
Teaching	0.136	0.343
Government	0.287	0.452
HMO Penetration Change between 95-85	0.111	0.164
Firm size	29.098	8.985
Only hospital	0.333	0.472
Only hospital*poor	0.079	0.271
Only hospital*teaching	0.064	0.244
Only hospital*Government	0.124	0.330
HMO Enrollment in 1985	0.035	0.061
Medicaid Enrollment in 1985	0.081	0.030
Medicare Enrollment in 1985	0.121	0.028
Percentage Uninsured in 1985	0.074	0.018
Medicaid Enrollment Growth (1985-95)	0.636	1.777
Medicare Enrollment Growth (1985-95)	0.098	0.351
Uninsured Growth (1985-95)	0.569	0.503
Hospitals in the Market in 1985	4.320	7.165
Average Number of Beds	268.855	192.266
Log (Family Income) in 1985	10.215	0.134
Percentage population older than 65	0.099	0.104
Change in Log (Family Income)	0.518	0.19
Change in Percentage population 65+	0.026	0.106
Change in Log (Population)	0.137	0.241

Where **poor, government** and **teaching** are dummy variables designating the type of hospitals that constitute the hospital group that is the unit of observation ***Only hospital*** is a dummy equal to one if this is the only hospital in its category in the MSA.

Table 1.4. Managed Care Effects on the Number of Hospitals and Units of Services Provided

	Hosp95		ER 95		Obstetrics95		Inp. alcoh&drug 95		outp. alcoh&drug95		Any alcoh&drug9	
	Hosp85		ER 85		Obstetrics85		Inp. alcoh&drug 85		outp. alcoh&drug85		Any alcoh&drug9	
	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)
HMO change*poor	-0.237**	-0.265**	-0.258*	-0.311**	-0.527*	-0.438*	-0.526**	-0.534*	0.688	0.417	-0.490	-0.528
	[0.122]	[0.16]	[0.143]	[0.215]	[0.293]	[0.249]	[0.270]	[0.278]	[0.679]	[0.716]	[0.547]	[0.567
HMO change*teaching	-0.116	-0.124	-0,189	-0,195	0.094	0.113	-0.461	-0.369	0,198	0,115	-0,381	-0,293
	[0.120]	[0.121]	[0.194]	[0.198]	[0.240]	[0.254]	[0.487]	[0.505]	[0.626]	[0.628]	[0.543]	[0.564
HMO change * gov	-0.163*	-0.174*	-0.668**	-0.624**	-0,245	-0,259	-0.175**	-0.184**	0.028	-0.455	-0.273	-0.287
	[0.098]	[0.090]	[0.289]	[0.292]	[0.353]	[0.367]	[0.075]	[0.078]	[0.671]	[0.627]	[0.535]	[0.551
Poor	-0,052	-0.066*	-0,075	-0.105*	-0.081	-0.117	-0.119	-0,.104	-0.132	-0.071	-0.044	-0.010
	[0.036]	[0.046]	[0.058]	[0.063]	[0.079]	[0.085]	[0.125]	[0.133]	[0.145]	[0.146]	[0.128]	[0.134
Teaching	-0.054	-0.061	0,059	0,034	-0.285**	-0.289**	-0.113	-0.096	0.209	0.232	0.192	0.213
	[0.044]	[0.046]	[0.086]	[0.087]	[0.086]	[0.093]	[0.148]	[0.151]	[0.226]	[0.218]	[0.157]	[0.160
Government	-0,004	-0,013	0.082	0.076	-0.123*	-0.128*	-0.043	-0.018	-0,147	-0,103	-0.054	-0.023
	[0.028]	[0.029]	[0.059]	[0.060]	[0.067]	[0.070]	[0.110]	[0.116]	[0.130]	[0.137]	[0.107]	[0.111
HMO Change	-0.020	-0.040	0.005	0.063	-0,094	-0,050	-0.415*	-0,470	0,022	0,104	0.455	0.51
	[0.070]	[0.070]	[0.118]	[0.120]	[0.184]	[0.191]	[0.251]	[0.373]	[0.390]	[0.387]	[0.365]	[0.37
Only hospital	0.131**	0.125**	0,024	0,021	0.183**	0.210**	0,103	0,090	0.358**	0.374**	0.035	0.02
	[0.022]	[0.023]	[0.069]	[0.074]	[0.087]	[0.096]	[0.200]	[0.204]	[0.159]	[0.153]	[0.198]	[0.19
Only hospital*poor	0.070*	0.081**	0.040	0.063	0.162	0.201	-0.377	-0.324	-0.518**	-0.526*	-0.345	-0.28
	[0.036]	[0.038]	[0.107]	[0.114]	[0.131]	[0.141]	[0.279]	[0.290]	[0.265]	[0.268]	[0.275]	[0.28
Only hospital*Teaching	0,060	0,064	0,043	0,043	0.334**	0.349**	-0.287	-0.363	-0.128**	-0,130	-0.546**	-0,60
	[0.039]	[0.040]	[0.097]	[0.103]	[0.108]	[0.115]	[0.255]	[0.261]	[0.284]	[0.289]	[0.258]	[0.26
Only hospital*gov	0,009	0,018	0.125*	0.129*	0.090**	0,156	0.305*	0.285*	-0.493	-0.494*	-0.234	-0.21
	[0.028]	[0.030]	[0.073]	[0.074]	[0.041]	[0.128]	[0.181]	[0.144]	[0.275]	[0.257]	[0.235]	[0.23
Demographic Characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Hospital Characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	894	894	894	894	894	894	894	894	894	894	894	894
R2	0.173	0.174	0.154	0.163	0.180	0.202	0.268	0.286	0.289	0.331	0.237	0.26

The unit of observation is the group of hospitals of a particulat kind. Each MSA has 4 potential different hospital groups.

(1) Corresponds to the OLS regressions. **(2)** corresponds to the instrumental variable regression where the IV for HMO change is the average firm size at the MSA level.

All regressions include average number of beds for the hospitals, occupancy rate in the market, hospitals in the market in 1985 as well as the following demographics at the MSA level: percentage of uninsured, percentage of Medicare enrollees, percentage of Medicaid enrollees, percentage of population enrolled in HMOs, log(family income), log(population), percentage of population 65 and older. All the demographic variables include their 1985 level and the 1985-95 change.

Robust standard errors appear in brackets. All regressions include 51 state dummy variables and 7 MSA size dummy variables.

* Statistically significantly different from zero at the 10 percent level. * *Statistically significantly different from zero at the 5 percent level.

Table 1.5. Managed Care Effects on Number of Services in the Market. Control Group

	Hosp95		ER 95		Obstetrics95		Inp. alcoh&drug 95		outp. alcoh&drug95		Any alcoh&drug9	
	Hosp85		ER 85		Obstetrics85		Inp. alcoh&drug 85		outp. alcoh&drug85		Any alcoh&drug9	
	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)
HMO change*poor	-0.237**	-0.265**	-0.258*	-0.311**	-0.527*	-0.438*	-0.526**	-0.534*	0.688	0.417	-0.490	-0.52
	[0.122]	[0.16]	[0.143]	[0.215]	[0.293]	[0.249]	[0.270]	[0.278]	[0.679]	[0.716]	[0.547]	[0.567
HMO change*teaching	-0.116	-0.124	-0.189	-0.195	0.094	0.113	-0.461	-0.369	0,198	0,115	-0.381	-0.29
	[0.120]	[0.121]	[0.194]	[0.198]	[0.240]	[0.254]	[0.487]	[0.505]	[0.626]	[0.628]	[0.543]	[0.564
HMO change * gov	-0.163*	-0.174*	-0.668**	-0.624**	-0.245	-0.259	-0.175**	-0.184**	0.028	-0.455	-0.273	-0.28
	[0.098]	[0.090]	[0.289]	[0.292]	[0.353]	[0.367]	[0.075]	[0.078]	[0.671]	[0.627]	[0.535]	[0.551
Poor	-0,052	-0.066*	-0.075	-0.105*	-0.081	-0.117	-0.119	-0,.104	-0.132	-0.071	-0.044	-0.01
	[0.036]	[0.046]	[0.058]	[0.063]	[0.079]	[0.085]	[0.125]	[0.133]	[0.145]	[0.146]	[0.128]	[0.134
Teaching	-0.054	-0.061	0,059	0,034	-0.285**	-0.289**	-0.113	-0.096	0.209	0.232	0.192	0.213
	[0.044]	[0.046]	[0.086]	[0.087]	[0.086]	[0.093]	[0.148]	[0.151]	[0.226]	[0.218]	[0.157]	[0.160
Government	-0,004	-0,013	0.082	0.076	-0.123*	-0.128*	-0.043	-0.018	-0,147	-0,103	-0.054	-0.02
	[0.028]	[0.029]	[0.059]	[0.060]	[0.067]	[0.070]	[0.110]	[0.116]	[0.130]	[0.137]	[0.107]	[0.111
HMO Change	-0.020	-0.040	0.005	0.063	-0,094	-0,050	-0.415*	-0,470	0.022	0.104	0.455	0.51
	[0.070]	[0.070]	[0.118]	[0.120]	[0.184]	[0.191]	[0.251]	[0.373]	[0.390]	[0.387]	[0.365]	[0.37
Only hospital	0.131**	0.125**	0.024	0.021	0.183**	0.210**	0.103	0.090	0.358**	0.374**	0.035	0.02
	[0.022]	[0.023]	[0.069]	[0.074]	[0.087]	[0.096]	[0.200]	[0.204]	[0.159]	[0.153]	[0.198]	[0.19
Only hospital*poor	0.070*	0.081**	0.040	0.063	0.162	0.201	-0.377	-0.324	-0.518**	-0.526*	-0.345	-0.28
	[0.036]	[0.038]	[0.107]	[0.114]	[0.131]	[0.141]	[0.279]	[0.290]	[0.265]	[0.268]	[0.275]	[0.28
Only hospital*Teaching	0.060	0.064	0.043	0.043	0.334**	0.349**	-0.287	-0.363	-0.128**	-0,130	-0.546**	-0,60
	[0.039]	[0.040]	[0.097]	[0.103]	[0.108]	[0.115]	[0.255]	[0.261]	[0.284]	[0.289]	[0.258]	[0.26
Only hospital*gov	0.009	0.018	0.125*	0.129*	0.090**	0,156	0.305*	0.285*	-0.493	-0.494*	-0.234	-0.21
	[0.028]	[0.030]	[0.073]	[0.074]	[0.041]	[0.128]	[0.181]	[0.144]	[0.275]	[0.257]	[0.235]	[0.23
Demographic Characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Hospital Characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	894	894	894	894	894	894	894	894	894	894	894	894
R2	0.173	0.174	0.154	0.163	0.180	0.202	0.268	0.286	0.289	0.331	0.237	0.26

The unit of observation is the group of hospitals of a particulat kind. Each MSA has 4 potential different hospital groups.

(1) Corresponds to the OLS regressions. **(2)** corresponds to the instrumental variable regression where the IV for HMO change is the average firm size at the MSA level.

All regressions include average number of beds for the hospitals, occupancy rate in the market, hospitals in the market in 1985 as well as the following demographics at the MSA level: percentage of uninsured, percentage of Medicare enrollees, percentage of Medicaid enrollees, percentage of population enrolled in HMOs, log(family income), log(population), percentage of population 65 and older. All the demographic variables include their 1985 level and the 1985-95 change.

Robust standard errors appear in brackets. All regressions include 51 state dummy variables and 7 MSA size dummy variables.

* Statistically significantly different from zero at the 10 percent level. * *Statistically significantly different from zero at the 5 percent level.

Table 1.6. Managed Care Effects on the Provision of Charity Care in California

THE FIRST COLUMN INDICATES THE DEPENDENT VARIABLES.

	%MSA UC Provided in 95		%MSA MCal Provided in 95		%MSA UC & MCal Provided in 95		%MSA MCR Provided in 95	
	% MSA UC Provided in 85		% MSA MCal Provided in 85		% MSA UC & MCal Provided in 85		% MSA MCR Provided in 85	
	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)	.(1)	.(2)
HMO change*poor	-0.804	-0.487	-3.717	-4.072	0.868	0.977	-0.706	-0.665
	[3.000]	[3.533]	[4.636]	[4.901]	[1.648]	[1.826]	[0.734]	[0.791]
HMO change*teaching	5.705	5.515	-8.325	-8.109	0.802	0.736	-1.374	-1.386
	[4.029]	[4.455]	[7.952]	[7.839]	[2.428]	[2.558]	[1.326]	[1.354]
HMO change * gov	4.999*	4.986**	-14.898	-16.138	3.950**	4.026**	-1.879	-1.741
	[2.644]	[2.359]	[10.903]	[11.392]	[1.926]	[2.052]	[1.592]	[1.688]
Poor	1.198**	0.955*	-1.354	-1.077	0.542*	0.458	-0.566**	-0.603**
	[0.582]	[0.577]	[1.003]	[0.976]	[0.323]	[0.294]	[0.213]	[0.199]
Teaching	2.037	1.699	-2.175	-1.790	-0.420	-0.537	-0.724**	-0.760**
	[1.367]	[1.493]	[1.826]	[1.771]	[0.771]	[0.801]	[0.356]	[0.362]
Government	0.939	0.701	-1.168	-0.896	0.264	0.182	-0.160	-0.197
	[0.710]	[0.716]	[0.992]	[0.938]	[0.470]	[0.454]	[0.237]	[0.212]
HMO change	-7.099	-7.335	27.666	11.194	-1.903	-3.096	1.274	1.295
	[10.289]	[7.291]	[22.709]	[9.682]	[6.022]	[4.264]	[4.389]	[1.595]
Only hospital	0.735	0.296	-1.615	-1.115	-0.053	-0.205	-0.088	-0.152
	[1.076]	[0.996]	[1.215]	[1.228]	[0.645]	[0.595]	[0.385]	[0.347]
Only hospital*poor	-0.925	-0.303	2.033	1.324	-0.396	-0.181	0.883**	0.972**
	[1.169]	[0.974]	[1.336]	[1.199]	[0.554]	[0.439]	[0.390]	[0.345]
Only hospital*Teaching	-1.572	-1.227	2.634	2.241	0.274	0.393	0.396	0.440
	[1.531]	[1.538]	[1.909]	[1.920]	[0.807]	[0.780]	[0.498]	[0.483]
Only hospital*gov	0.153	1.127	9.114**	8.002*	0.665	1.002	-0.319	-0.183
	[1.549]	[1.559]	[4.360]	[4.233]	[0.886]	[0.869]	[0.674]	[0.606]
Demographic Characteristics	yes	yes	yes	yes	yes	yes	yes	yes
Hospital Characteristics	yes	yes	yes	yes	yes	yes	yes	yes
N	88	88	88	88	88	88	88	88
R2	0.202	0.294	0.271	0.286	0.292	0.307	0.206	0.345

UC refers to uncompensated care and **Mcal** to Medi-Cal. **%MSA UC Provided in 95/%MSA UC Provided in 85** measures the portion of the everall MSA uncompensated care provided by the group of hospitals in 1995 relative to the proportion they served in 1985.
(1) Corresponds to the OLS regressions. **(2)** corresponds to the instrumental variable regression where the IV for HMO change is the average firm size at the MSA level.
All regressions include average number of beds for the hospitals in the market, hospitals in the market in 1985 as well as the following demographics at the MSA level: percentage of uninsured, percentage of Medicare enrollees, percentage of Medicaid enrollees, percentage of population enrolled in HMOs, log(family income), log(population), percentage of population 65 and older. All the demographic variables include their 1985 level and the 1985-95 change.
Robust standard errors appear in brackets.
*Statistically significantly different from zero at the 10 percent level. **Statistically significantly different from zero at the 5 percent level.

Table 1.7. Managed Care Effects on Quality for California

DEPENDENT VARIABLE: PROPORTION OF PATIENTS WITH HEART ATTACK THAT DIED IN 95 RELATIVE TO THE PROPORTION THAT DIED IN 85, FOR EACH HOSPITAL GROUP

	.(1)	.(2)	.(3)	.(4)	.(1)b	.(2)b	.(3)b	.(4)b
					length of stay <6 days			
HMO change*poor	0.849	0.849	0.720	0.672	0.553	0.554	0.029	0.025
	[0.740]	[0.741]	[0.819]	[0.790]	[1.475]	[1.476]	[1.540]	[1.534]
HMO change*teaching	1.568*	1.573*	1.588	1.472	2.534**	2.533**	1.673	1.665
	[0.879]	[0.871]	[1.003]	[0.938]	[1.114]	[1.114]	[1.220]	[1.221]
HMO change * gov	2.107*	2.099*	1.717*	1.699**	1.117*	1.113*	0.314**	0.309**
	[1.201]	[1.210]	[0.088]	[0.761]	[0.652]	[0.650]	[0.143]	[0.141]
Poor	0.064	0.067	0.037	0.013	0.081	0.081	0.063	0.063
	[0.125]	[0.115]	[0.122]	[0.108]	[0.273]	[0.273]	[0.239]	[0.239]
Teaching	0.123	0.125	0.250	0.207	0.266	0.266	0,106	0,105
	[0.178]	[0.174]	[0.172]	[0.164]	[0.354]	[0.354]	[0.250]	[0.250]
Government	0.156	0.161	0.114	0.069	0.446	0.447	0.205	0.206
	[0.178]	[0.163]	[0.232]	[0.191]	[0.345]	[0.347]	[0.267]	[0.269]
HMO Change	-0.5506*	-0.5738**	-0,059	0,591	0.142	0.14	-0.31	-0.344
	[0.2989]	[0.1616]	[2.943]	[2.637]	[1.784]	[1.787]	[0.372]	[0.384]
Only hospital	0,133	0.142	-0.176	-0.265*	0.106	0.107	-0.227	-0.226
	[0.355]	[0.315]	[0.223]	[0.158]	[0.332]	[0.332]	[0.296]	[0.296]
Only hospital*poor	-0,140	-0.150	0.252	0.318**	0.256	0.256	0,356	0,352
	[0.354]	[0.335]	[0.164]	[0.148]	[0.384]	[0.382]	[0.350]	[0.350]
Only hospital*Teaching	-0.582	-0.589	-0.287	-0.197	-0.679	-0.683	-0.050	-0.053
	[0.397]	[0.374]	[0.268]	[0.214]	[0.792]	[0.794]	[0.455]	[0.454]
Only hospital*gov	0.322	0.303	0.602	0.742*	-0.311	-0.312	0.061	0.058
	[0.522]	[0.447]	[0.479]	[0.393]	[0.633]	[0.634]	[0.467]	[0.468]
Demographic Characteristics	yes	yes	yes	yes	yes	yes	yes	yes
Hospital Characteristics	yes	yes	yes	yes	yes	yes	yes	yes
N	88	88	62	62	88	88	62	62
R2	0.238	0.238	0.286	0.183	0.370	0.369	0.298	0.299

(1) Includes all urban hospitals in California

(2) The same as (1) instrumenting HMO penetration by average firm size in the MSA.

(3) FOR HOSPITAL WITH CARDIAC INTENSIVE CARE, %Population with AMI that died in 1995 / %population with AMI that died in 1985

(4) The same as (3) instrumenting HMO penetration by average firm size in the MSA.

(1)b, (2)b, (3)b, (4)b The same as (1), (2), (3) and(4) limiting the sample to those patients that stayed at the hospital 5 or less days.

All regressions include average number of beds for the hospitals in the market, hospitals in the market in 1985, as well as the following demographics at the MSA level: percentage of uninsured, percentage of Medicare enrollees, percentage of Medicaid enrollees, percentage of population enrolled in HMOs, log(family income), log(population), percentage of population 65 and older. All the demographic variables include their 1985 level and the 1985-95 change. Robust standard errors appear in brackets.

* Statistically significantly different from zero at the 10 percent level

* *Statistically significantly different from zero at the 5 percent level

Table 1.8. Who Gets Hurt by Managed Care? Probit Regressions

DEPENDENT VARIABLE: dummy equal to 1 if the AMI patient died in the hospital and zero otherwise. PATIENT LEVEL OBSERVATIONS

	Charity Care Patients	Patients Living in Poor Areas	Patients Going to Government Hosp.	All of Them
HMO*Charity * 1995	0.136*			0.294***
	[0.078]			[0.112]
HMO*poor*1995		0.076**		0.100**
		[0.042]		[0.048]
HMO*gov*1995			0.101*	0.095**
			[0.053]	[0.057]
HMO*Charity	0.001			0.083**
	[0.030]			[0.036]
HMO*Poor		-0.043**		-0.006
		[0.002]		[0.028]
HMO*Gov			0.062**	0.062**
			[0.027]	[0.029]
HMO*1995	-0.025	-0.043**	-0.039*	-0.082***
	[0.019]	[0.022]	[0.022]	[0.027]
Charity*1995	-0.043			-0.084***
	[0.027]			[0.022]
Poor*1995		-0.024**		-0.039**
		[0.013]		[0.014]
Gov*1995			-0.049***	-0.043**
			[0.013]	[0.016]
Charity patient	0.025***	0.028***		0.035***
	[0.006]	[0.005]		[0.005]
Patient from poor area	-0.006	0.003		-0.007
	[0.005]	[0.007]		[0.008]
Going to Gov. Hosp.			0.005	0.004
			[0.007]	[0.009]
Year 1995	-0.039***	-0.0032***	-0.030***	-0.035**
	[0.007]	[0.009]	[0.009]	[0.011]
HMO Penetration	-0.013	-0.002	-0.017	0.017
	[0.014]	[0.015]	[0.016]	[0.018]
N	88	88	62	62
R2	0,238	0,238	0,286	0,183

Charity is a dummy equal to 1 if the patient receives charity care.

Poor is a dummy equal to 1 if the patient lives in a poor area.

Gov is a dummy equal to 1 if the patient goes to a government hospital

All regressions include average number of beds for the hospitals in the market, hospitals in the market in 1985, as well as the following demographics at the MSA level: percentage of uninsured, percentage of Medicare enrollees, percentage of Medicaid enrollees, percentage of population enrolled in HMOs, log(family income), log(population), percentage of population 65 and older. All the demographic variables include their 1985 level and the 1985-95 change. Robust standard errors appear in brackets.

* Statistically significantly different from zero at the 10 percent level

* *Statistically significantly different from zero at the 5 percent level

Table 1.9.a. Demographic Characteristics of Charity Care Patients

	All Charity Care Patients			
	1985		1995	
	Mean	Std. Dev	Mean	Std. Dev
Age	28.17	19.35	34.08	19.21
White	0.516	0.499	0.442	0.497
Black	0.089	0.285	0.103	0.304
Hispanic	0.324	0.468	0.356	0.479
Native American/ Eskimo/Aleut	0.005	0.070	0.004	0.063
Asian/Pacific Islander	0.042	0.201	0.065	0.246
Male	0.444	0.497	0.523	0.499

Table 1.9.b. Demographic Characteristics of Charity Care Patients With Heart Attack

	1985		1995	
	Mean	Std. Dev	Mean	Std. Dev
Age	54.8	11.09	54.6	10.98
White	0.696	0.460	0.584	0.493
Black	0.091	0.287	0.093	0.290
Hispanic	0.137	0.344	0.207	0.405
Native American/ Eskimo/Aleut	0.006	0.075	0.003	0.054
Asian/Pacific Islander	0.041	0.198	0.074	0.262
Male	0.729	0.444	0.739	0.439

APPENDIX

Table 1.A. Impact of HMO Penetration on the Uninsured's Health

DEPENDENT VARIABLE: dummy equal to 1 if the heart attack patient died in the hospital and 0 otherwise

				Length of stay<6 days		
	.(1)	.(2)	.(3)	.(1)b	.(2)b	.(3)b
HMO*Charity*1995	0.117*	0.235***	0.136*	0.358***	0.441***	0.258*
	[0.060]	[0.074]	[0.078]	[0.073]	[0.092]	[0.141]
HMO*Charity	-0.006	-0.086***	0.001	-0.281***	-0.390***	-0.184***
	[0.026]	[0.028]	[0.030]	[0.042]	[0.046]	[0.047]
HMO*1995	-0.012	-0.094**	-0.025	-0.062*	-0.154*	-0.095***
	[0.020]	[0.046]	[0.019]	[0.031]	[0.080]	[0.029]
Charity*1995	-0.028	-0.076**	-0.043	0.016	-0.020	-0.015
	[0.022]	[0.029]	[0.027]	[0.026]	[0.036]	[0.052]
Charity care	0.019***	0.018**	0.025***	0.014*	0.040**	0.029***
	[0.005]	[0.006]	[0.006]	[0.008]	[0.009]	[0.009]
Year 1995	-0.046***	0.022	-0.039***	-0.209***	-0.095*	-0.185***
	[0.008]	[0.030]	[0.007]	[0.011]	[0.051]	[0.014]
HMO penetration	-0.014	-0.138*	-0.013	0.032	-0.348**	0.030
	[0.015]	[0.075]	[0.014]	[0.028]	[0.128]	[0.022]
Poor	-0.007	-0.010	-0.006	-0.005	-0.009	-0.003
	[0.005]	[0.006]	[0.005]	[0.007]	[0.009]	[0.007]
N	71080	71080	71080	34784	34784	34784
R2	0.331	0.334	0.175	0.353	0.365	0.185

Charity is a dummy equal to one if the patient receives charity care, ***poor*** is a dummy equal to 1 if the patient lives in a poor area.

(1) OLS regression, **(2)** with IV instrumenting HMO penetration by firm size, **(3)** probit. **(1)b**, **(2)b**, **(3)b** are the same regressions but including only patients that stay in the hospital 5 days or less

1995 is a dummy equal to 1 if year==1995 and 0 if year==1985

Robust standard errors appear in brackets

* Statistically significantly different from zero at the 10 percent level

* *Statistically significantly different from zero at the 5 percent level

*** statistically significant at 1 percent level

All regressions include the following *Demographic Variables*: race/ethnicity dummies (African American, Asian, Hispanic, Native American), male dummy, age (8 age groups starting at age 35), age and race interactions, age and sex interactions, race and sex interactions.

All regressions include the following *Zip Variables*:percentage in poverty, percentage unemployed, percentage with high school or more, population. The following MSA variables are also included: HMO penetration, MCR penetration, MCD penetration and percentage of uninsured

For the previous MSA variables I included both their level in 1985 and the change berween 1985 and 1995.

Table 1.B. Impact of HMO Penetration on the Health of Heart Attack Patients Living in Poor Neighborhoods

				Length of stay<6 days		
	.(1)	.(2)	.(3)	.(1)b	.(2)b	.(3)b
HMO*poor*1995	0.070*	0.159**	0.076**	0.030	0.105	0.057
	[0.042]	[0.063]	[0.042]	[0.068]	[0.108]	[0.065]
HMO*poor	-0.041	-0.068	-0.004**	-0.029	-0.006	-0.025
	[0.027]	[0.043]	[0.002]	[0.056]	[0.093]	[0.040]
HMO*1995	-0.029	-0.118**	-0.043**	-0.048	-0.131	-0.098**
	[0.023]	[0.050]	[0.022]	[0.035]	[0.087]	[0.033]
Poor*1995	-0.024	-0.068***	-0.024**	-0.014	-0.057	-0.017
	[0.015]	[0.025]	[0.013]	[0.022]	[0.038]	[0.021]
Poor neighborhood	0.003	0.014	0.003	0.005	0.002	0.002
	[0.007]	[0.013]	[0.007]	[0.014]	[0.028]	[0.011]
Year 1995	-0.039***	-0.032	-0.032***	-0.203***	-0.098*	-0.179***
	[0.009]	[0.032]	[0.009]	[0.013]	[0.054]	[0.016]
HMO penetration	-0.003	-0.106	-0.002	0.020	-0.031	0.027
	[0.017]	[0.078]	[0.015]	[0.031]	[0.132]	[0.024]
Charity Care Patient	0.022***	0.028***	0.028***	0.009*	0.071***	0.013**
	[0.004]	[0.004]	[0.005]	[0.006]	[0.007]	[0.007]
N	71080	71080	71080	34784	34784	34784
R2	0.331	0.324	0.175	0.353	0.365	0.185

Charity is a dummy equal to one if the patient receives charity care, ***poor*** is a dummy equal to 1 if the patient lives in a poor area.
(1) OLS regression, **(2)** with IV instrumenting HMO penetration by firm size, **(3)** probit. **(1)b**, **(2)b**, **(3)b** are the same regressions but including only patients that stay in the hospital 5 days or less
1995 is a dummy equal to 1 if year==1995 and 0 if year==1985
Robust standard errors appear in brackets
* Statistically significantly different from zero at the 10 percent level
* *Statistically significantly different from zero at the 5 percent level
*** statistically significant at 1 percent level
All regressions include the following *Demographic Variables*: race/ethnicity dummies (African American, Asian, Hispanic, Native American), male dummy, age (8 age groups starting at age 35), age and race interactions, age and sex interactions, race and sex interactions.
All regressions include the following *Zip Variables*:percentage in poverty, percentage unemployed, percentage with high school or more, population. The following MSA variables are also included: HMO penetration, MCR penetration, MCD penetration and percentage of uninsured
For the previous MSA variables I included both their level in 1985 and the change berween 1985 and 1995.

Table 1.C. Impact of HMO Penetration on Probability of Dying from Heart Attack Patients Going to Government Hospitals

DEPENDENT VARIABLE: dummy equal to 1 if the patient died in the hospital and 0 otherwise

				Length of stay<6 days		
	.(1)	.(2)	.(3)	.(1)b	.(2)b	.(3)b
HMO*Gov*1995	0.093*	0.224**	0.101*	0.131*	0.008	0.123*
	[0.053]	[0.077]	[0.053]	[0.080]	[0.124]	[0.070]
HMO*Gov hospital	0.061*	0.015	0.062**	0.019	0.123	0.044
	[0.031]	[0.050]	[0.027]	[0.062]	[0.099]	[0.044]
HMO*1995	-0.026	-0.131**	-0.039*	-0.056	-0.136	-0.096**
	[0.023]	[0.050]	[0.022]	[0.037]	[0.088]	[0.034]
Gov Hospital*1995	-0.055**	-0.113***	-0.049***	-0.053*	-0.009	-0.048*
	[0.019]	[0.030]	[0.013]	[0.027]	[0.046]	[0.022]
Gov hospital	0.007	0.021	0.005	0.009	-0.026	0.004
	[0.009]	[0.018]	[0.007]	[0.017]	[0.033]	[0.012]
Year 1995	-0.036***	-0.038	-0.030***	-0.203***	-0.095*	-0.182***
	[0.009]	[0.033]	[0.009]	[0.013]	[0.056]	[0.016]
HMO penetration	-0.018	-0.107	-0.017	0.016	-0.348	0.020
	[0.017]	[0.084]	[0.016]	[0.033]	[0.244]	[0.026]
Charity Care Patient	0.016***	0.034***	0.019***	0.001	0.078***	0.004
	[0.004]	[0.005]	[0.005]	[0.006]	[0.007]	[0.008]
Poor	-0.005	-0.006	-0.004	-0.001	-0.0002	0.001
	[0.005]	[0.006]	[0.005]	[0.07]	[0.010]	[0.007]
N	61519	61519	61519	29991	29991	29991
R2	0.153	0.114	0.175	0.161	0.123	0.183

Gov is a dummy equal to one if the patient went to a government hospital. ***Charity*** is a dummy equal to one if the patient receives charity care, **poor** is a dummy equal to 1 of the patient lives in a poor area.

(1) OLS regression, **(2)** with IV instrumenting HMO penetration by firm size, **(3)** probit. **(1)b**, **(2)b**, **(3)b** are the same regressions but including only patients that stay in the hospital 5 days or less

1995 is a dummy equal to 1 if year==1995 and 0 if year==1985

Robust standard errors appear in brackets

* Statistically significantly different from zero at the 10 percent level

* *Statistically significantly different from zero at the 5 percent level

*** statistically significant at 1 percent level

All regressions include the following *Demographic Variables*: race/ethnicity dummies (African American, Asian, Hispanic, Native American), male dummy, age (8 age groups starting at age 35), age and race interactions, age and sex interactions, race and sex interactions.

All regressions include the following *Zip Variables*:percentage in poverty, percentage unemployed, percentage with high school or more, population. The following MSA variables are also included: HMO penetration, MCR penetration, MCD penetration and percentage of uninsured For the previous MSA variables I included both their level in 1985 and the change berween 1985 and 1995.