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Does contracting out increase the efficiency of government programs? Evidence from Medicaid HMOs

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Abstract

State governments contract with health maintenance organizations (HMOs) to coordinate medical care for nearly 20 million Medicaid recipients. Identifying the causal effect of HMO enrollment on government spending and health care quality is difficult if, as is often the case, recipients have the option to enroll in a plan. To estimate the average effect of HMO enrollment, this paper exploits county-level mandates introduced during the last several years in the state of California that required most Medicaid recipients to enroll in a managed care plan. The empirical results demonstrate that the resulting switch from fee-for-service to managed care was associated with a substantial increase in government spending but no corresponding improvement in infant health outcomes. The findings cast doubt on the hypothesis that HMO contracting has reduced the strain on government budgets.

JEL classification: H51; H57; H72; I11; I18; L33
Keywords: Medicaid; HMO; Fee-for-service

1. Introduction

A central issue in public finance concerns the desirability of contracting public services out to the private sector. Advocates of contracting out argue that private firms are more efficient and are more likely to offer a range of services that will allow each individual to get closer to her preferred bundle. Opponents assert that private firms reduce non-contractible quality and avoid unprofitable clients. As previous researchers have noted, the optimal public–private mix is likely to vary across government services, with an easy-

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to-monitor service like garbage collection a strong candidate for contracting out and national defense located at the opposite end of the spectrum (Shleifer, 1998).

Though the extent of private sector involvement has been growing for a number of government services in the U.S., perhaps the most striking recent change has been the increasing role of private managed care organizations in the government's Medicare and Medicaid programs. Rather than directly reimbursing hospitals, physicians, and other health care providers, the federal and individual state governments now contract with HMOs and similar managed care organizations to coordinate medical care for more than one-third of the 75 million beneficiaries of these two programs. In most cases, the managed care plans are paid a fixed amount each month per enrollee. This payment may vary with recipient characteristics but typically does not increase if the recipient's health deteriorates or if she receives intensive treatments.

This shift from fee-for-service to managed care was to some extent motivated by a desire to reduce both the level and the growth rate of expenditures in these two public programs. Taken together, Medicare and Medicaid now account for more than US$550 billion in government spending and are projected to account for an increasing share of GDP in future years. While these two programs provide valuable insurance to two of society's most vulnerable groups—the elderly and the poor—the method of payment that Medicare and Medicaid use introduces significant distortions in medical care purchase decisions. Because the fee-for-service system does not constrain health care utilization and program participants only face a fraction of the price of additional medical care, individuals are likely to consume some services that provide a benefit substantially less than the cost.

If managed care plans have information about the value that their Medicare and Medicaid enrollees are likely to place on particular treatments, they may be well positioned to reduce medical care utilization while still providing valuable insurance against adverse health shocks.[1] In the limit, the set of marginal services—those covered by fee-for-service but not under managed care—would yield no health benefit and thus medical care spending could decline with no change in individuals' health outcomes. Depending on the extent of moral hazard in medical care purchase decisions, the government could potentially lower public medical spending by contracting with organizations that can constrain health care utilization and more accurately measure the costs and benefits of particular services.

There are three additional channels through which HMOs could lower health care spending and increase the efficiency of medical care. First, because their reimbursement does not increase in response to changes in the health of their enrollees, managed care organizations will have a financial incentive to keep their beneficiaries healthy. Thus, plans may use their superior information about the benefits of health care treatments and lifestyle changes to encourage decisions that will lower future demand for medical care services. Additionally, plans may be able to negotiate lower input prices from medical care suppliers, with recent work showing that private managed care plans pay lower prices than their private fee-for-service counterparts for the same services (Cutler et al., 2000). And, finally, if the government contracts with multiple managed care plans, then the resulting

[1] See Glied (2000), Miller and Luft (1997), and Cutler et al. (2000) for more detailed discussions of the potential effects of managed care.

competition and the increase in the number of options that program participants have may lead to substantial improvements in medical care quality. For these reasons, it is possible that managed care plans can increase efficiency—either through a reduction in spending or by improving health care quality.

While the set of arguments in favor of contracting with HMOs is extensive, other theoretically appealing hypotheses suggest that shifting Medicare and Medicaid recipients to managed care will reduce program efficiency. Because each program insures approximately 40 million individuals, the federal and individual state governments are likely to have more market power than a typical HMO and may therefore be able to negotiate lower prices for medical care.[2] Additionally, to the extent that there are increasing returns to scale in program administration, contracting with multiple plans will increase total costs and reduce the fraction of spending devoted to medical care services. Third, the costs to the government will depend not just on the costs to the managed care organization but also on the amount by which plans markup their bids when competing for Medicaid HMO contracts. If the bidding process is not particularly competitive, then this markup could be substantial. And finally, because HMOs are reimbursed a fixed amount per recipient that depends on a limited set of observable characteristics, they may have an incentive to provide a mix of services that discourages some individuals from enrolling.

It is therefore largely an empirical question whether the shift from fee-for-service to managed care has increased the efficiency of these two large government programs. Medicare is a federally funded and administered program in which recipients have the option to enroll in an HMO but are not required to do so. Identifying the effect of managed care enrollment in this program is difficult for two reasons. First, because virtually all Medicare recipients can enroll in a managed care plan, it is likely that those who choose to enroll will differ in unobservable ways from those who do not. Second, even if one looks at changes in a particular recipient's spending or health outcomes following a switch into or out of managed care, it is plausible that a change in health and thus in the demand for medical care services caused the change.

In contrast to the Medicare program, Medicaid is administered by state governments and there is substantial variation across states and localities in the rules that influence Medicaid managed care enrollment. Furthermore, many Medicaid recipients are required to enroll in an HMO. Thus, both of the obstacles to identification are less of an issue for this program.

In this paper, I estimate the effect of HMO contracting by exploiting 20 county-level mandates passed in the state of California at different times during the 1990s that required millions of Medicaid recipients to enroll in an HMO.[3] This study represents the first one to utilize individual-level data to measure both the spending and the health outcome effects of such an ambitious shift in the insurance coverage of the

[2] A number of models predict that price discounts will increase with the market share of the buyer. See Stole and Zwiebel (1996) for the case of a monopoly supplier and Snyder (1998) for an example with competing suppliers.

[3] In the discussion that follows, I use the terms HMO and managed care plan interchangeably. It is worth noting that HMOs represent one type of managed care, but that other types of insurance would also be classified as managed care (e.g. preferred provider organizations). Because all of the 44 plans that have contracts in counties with a mandate are most accurately classified as HMOs, I do not distinguish between HMOs and other plan types.

Medicaid population.[4] Because the date that each Medicaid managed care mandate would take effect in each county was chosen far in advance by state government officials, I argue below that these laws provide plausibly exogenous variation in HMO enrollment among Medicaid recipients. In virtually every county that introduced a mandate, there was an immediate and significant increase in Medicaid HMO enrollment. The number of Medicaid managed care plans varied across counties, but in all cases the state government paid HMOs a fixed amount per recipient-month and the plans then paid hospitals, physicians, pharmacies, and other health care providers for medical care services. Recipients continued to bear no financial cost for any services covered by Medicaid—both the deductible and the co-pay remained at zero.[5]

In the first part of my empirical analysis, I use complete claims data for a 20% sample of California's Medicaid recipients to investigate the effect of HMO enrollment on total Medicaid spending. I focus on AFDC-linked[6] Medicaid recipients because these individuals were differentially affected by the mandates, while HMO enrollment for other Medicaid recipients (e.g. blind and disabled beneficiaries of the SSI program) in most counties with a mandate remained voluntary. My final sample consists of panel data for nearly 1.2 million AFDC recipients with at least 1 month of Medicaid eligibility in the state of California between January of 1993 and December of 1999. Using the existence of a mandate as an instrumental variable for enrollment in an HMO, my findings demonstrate that the average effect of the switch in enrollment induced by the mandates was to increase Medicaid spending by approximately 17%.

Whether the increase in government spending was associated with an improvement in health outcomes is the subject of the second part of my empirical analysis. For this question, I am unable to use the Medicaid claims data described above, because once a fee-for-service Medicaid recipient enrolls in a managed care plan I no longer have detailed information about his/her health care utilization (from which health could be estimated). I therefore use a different data source that is immune from this problem to estimate health among Medicaid recipients. Specifically, I use hospital discharge data for the 1993–1999 period to estimate the average health of Medicaid-insured infants at the county level. My findings here suggest that the shift from fee-for-service to managed care was not associated with a significant improvement in infant health outcomes.

[4] A substantial body of research examines the effect of Medicaid managed care on measures of health care quality (see Kaiser Commission on the Future of Medicaid, 1995 for a review) though few focus on health outcomes. Recent exceptions include Levinson and Ullman (1998) and Kaestner et al. (2002), with both studies using infant health as the outcome variable of interest. Notable papers that estimate the effect of Medicaid managed care on government spending include Leibowitz et al. (1992), Buchanan et al. (1996), and Goldman et al. (1998). All three of these studies have the advantage of random assignment, though each one examines just one pilot managed care plan. The current study considers the effect of nearly 50 HMOs for a substantially longer time period and also considers the effect of these plans on health outcomes.

[5] See Ellis and McGuire (1993) and Newhouse (1996) for a discussion of the tradeoffs associated with different degrees of supply and demand-side cost-sharing.

[6] The AFDC program was replaced by other programs in 1997. The largest of these other programs is CalWorks (California's name for Temporary Assistance to Needy Families), with the next largest including individuals eligible for Medicaid through Section 1931b of Title XIX of the Social Security Act. To simplify the discussion, I use the term AFDC throughout this paper.

Taken together, my results suggest that contracting with HMOs reduced the efficiency of California's Medicaid program. At a minimum, one can reject the hypothesis that the switch from fee-for-service to managed care reduced the state government's spending below what it otherwise would have been. It is unclear whether these results generalize to other categories of Medicaid recipients, to other state Medicaid programs, or to the federal Medicare program. But given that the mandates did mitigate the standard selection problem and that California's HMO market is among the most competitive in the U.S., the expenditure results described below should give pause to those who believe that HMO contracting is an effective strategy for controlling current and future public medical spending.

2. Medicaid managed care background

California's Medicaid program currently provides health insurance to nearly 6.5 million low-income individuals. Program participants are a diverse group, including newborn infants, the institutionalized elderly, and individuals in dozens of other Medicaid eligibility categories. Until the early 1990s, the vast majority of program participants were enrolled in a fee-for-service program, with the state of California directly reimbursing hospitals, physicians, pharmacies, and other health care providers for the costs associated with their medical care.

Perhaps because of dissatisfaction with the fee-for-service system, the state of California passed legislation in 1991 and in 1992 that made it significantly easier for the state's Department of Health Services to require certain groups of Medicaid recipients to enroll in an HMO. Prior to this change, just 12% of Medicaid recipients were voluntarily enrolled in a managed care plan. But during the next 8 years, the share of Medicaid recipients enrolled in an HMO consistently increased and stood at 51% by 1999. As Table 1 demonstrates, this increase tracked the national increase quite closely, with the corresponding figures for the U.S. as a whole standing at 10% in 1991 and 56% in 1999. Under this system, HMOs that contract with the state of California to coordinate medical care for Medicaid recipients are paid a fixed amount per recipient-month that varies across Medicaid eligibility categories.

Table 1
Medicaid managed care penetration rates 1991–2000

Year	U.S. Medicaid		California Medicaid	
	# Recipients	% Managed care	# Recipients	% Managed care
1991	28.3	9.5%	4.02	11.7%
1992	30.9	11.8%	4.49	12.5%
1993	33.4	14.4%	4.83	14.1%
1994	33.6	23.2%	5.01	16.3%
1995	33.4	29.4%	5.02	23.5%
1996	33.2	40.1%	5.11	23.1%
1997	32.1	47.8%	4.79	38.7%
1998	30.9	53.6%	4.90	45.8%
1999	31.9	55.6%	4.97	51.1%
2000	33.7	55.8%	5.04	50.1%

Data were obtained from HCFA publications and from www.hcfa.gov.

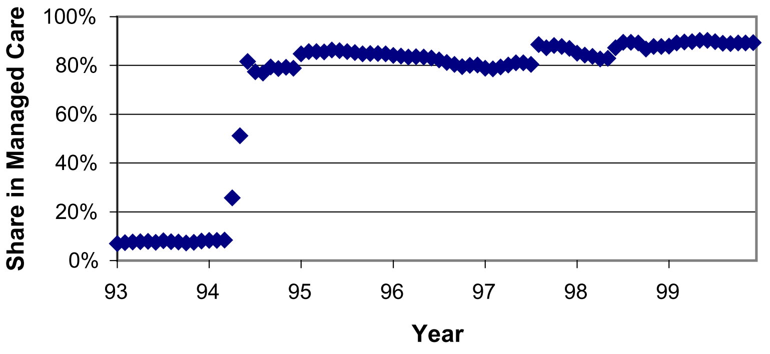

Fig. 1. Sacramento TANF Medicaid recipients.

While the growth at the state level proceeded quite smoothly during this time period, there was substantial variation across local market areas in the pace of managed care penetration. This variation was primarily driven by differences across counties in the timing of Medicaid managed care legislation. Beginning with Sacramento in April of 1994 and most recently with Monterey in October of 1999, certain categories of Medicaid recipients in the state of California were required to enroll in an HMO. The groups affected by the mandates and the number of plans from which recipients could choose varied substantially across counties.

There are three approaches that California has employed to shift its Medicaid recipients into managed care plans. In the first, which is referred to as Geographic Managed Care (GMC), the state government contracts with several commercial HMOs to coordinate care for Medicaid recipients. Plans initially applied by submitting a menu of prices at which they would be willing to insure each type of Medicaid recipient. The government then awarded contracts to the plans most likely to deliver high quality medical care at a low price, though the weight placed on quality and spending was not specified.

The first county to switch its Medicaid recipients to managed care under this model was Sacramento, where AFDC recipients and some other Medicaid beneficiaries were required to enroll in a plan beginning in April of 1994. Those affected by the mandate accounted for nearly 70% of Medicaid recipients but a smaller percentage of program spending. Aged, blind, and disabled individuals eligible for Medicaid through the Supplemental Security Income (SSI) program were not required to join an HMO but had the option to do so, while a small share of recipients (e.g. non-resident aliens) were not allowed to enroll in a plan. At the time of the mandate, approximately 8% of AFDC recipients were voluntarily enrolled in a managed care organization. This share increased steadily during the next several months, but never reached 100% (see Fig. 1).[7] Despite this, the increase from less than 10% to more than 80% in just 6 months was quite a significant change.

[7] There were three reasons for this. First, it often took a few months for newly eligible Medicaid recipients to become enrolled in a plan. Second, foster children receiving AFDC payments were not required to join a plan. And third, a small percentage of recipients were given waivers from the mandates and allowed to remain in the fee-for-service system.

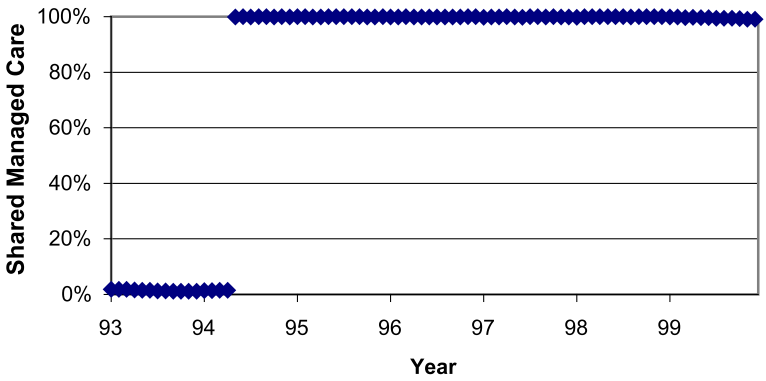

Fig. 2. Solano TANF Medicaid recipients.

As shown in Fig. 2, an even sharper change in managed care penetration occurred in Solano, the first county to switch its recipients into a county-organized health system (COHS) during the time period of interest.[8] Under this model, the not-for-profit, community-based HMO was reimbursed a fixed amount per recipient-month that varied by eligibility category. In contrast to Sacramento, recipients did not have a choice of plan in COHS counties. Additionally, the state government did not accept bids from commercial companies, instead deciding in advance to contract with one Medicaid-only HMO in each county. In addition to AFDC recipients, SSI recipients and individuals in most other Medicaid eligibility categories were required to enroll in the managed care plan.

The final model of Medicaid managed care used in California involved competition between one commercial plan and one private not-for-profit, Medicaid-only HMO. In these "two-plan" counties, the state solicited bids from private companies and awarded a contract to just one of the plans. Alameda was the first county to switch its Medicaid recipients into managed care plans using this model. The resulting increase in the fraction of recipients enrolled in an HMO was significant (see Fig. 3), though a bit less rapid than the increase in Sacramento. AFDC recipients were required to enroll in one of the two-plan while SSI recipients and most other Medicaid beneficiaries had the option to join a plan. Table 2 lists the counties that introduced Medicaid managed care mandates during the 1990s and the dates that each mandate was imposed. The final column gives the fraction of AFDC recipients who were voluntarily enrolled in a Medicaid managed care plan in the month before the mandate took effect, which varied from a low of 0% to a high of more than 58% in San Diego.

It is theoretically ambiguous which of these three models would be more likely to yield a favorable change in government spending and health outcomes relative to the fee-for-service system. Consider, for example, the effect of HMO contracting on government spending for a given level of quality. If the most important difference between the plan types is market power in negotiating with health care providers, then one might expect to find higher spending in GMC and two-plan counties. Alternatively,

[8] Medicaid recipients in Santa Barbara and San Mateo were required to join a county-organized health system starting in 1983 and 1987, respectively. I select Solano as the first because my data do not begin until 1993.

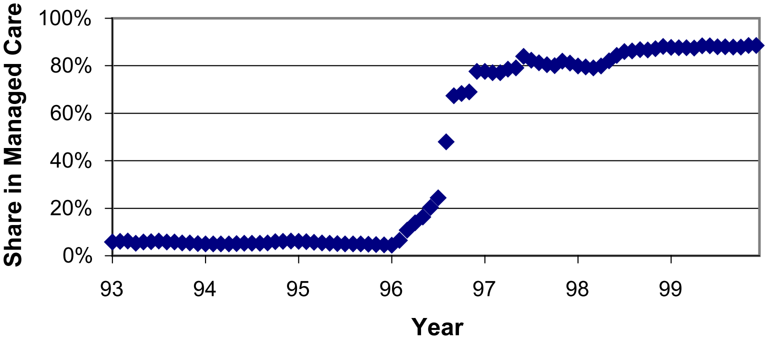

Fig. 3. Alameda TANF Medicaid recipients.

if the key distinction is the extent of competition in the bidding process for the HMO contracts, then one would find significantly higher spending in COHS counties (which did not have to compete to win the contract). And, finally, if the most important factor is the economies of scale in program administration, then one would expect to observe lower spending for a particular level of quality in COHS counties. In the empirical work that follows, I explore which of these hypotheses seems to most accurately describe California's experience with Medicaid HMOs from 1993 to 1999.

Table 2
Type and date of managed care mandate by county

County	Type of mandate	Date of mandate	Pre-mandate % MC
Santa Barbara	COHS	9/83	–
San Mateo	COHS	12/87	–
Sacramento	GMC	4/94	8.5%
Solano	COHS	5/94	1.4%
Orange	COHS	10/95	22.3%
Alameda	Two-plan	1/96	4.6%
Santa Cruz	COHS	1/96	0.0%
San Joaquin	Two-plan	2/96	0.9%
Kern	Two-plan	7/96	0.0%
San Francisco	Two-plan	7/96	14.1%
Riverside	Two-plan	9/96	30.3%
San Bernardino	Two-plan	9/96	30.2%
Santa Clara	Two-plan	10/96	4.1%
Fresno	Two-plan	11/96	4.3%
Contra Costa	Two-plan	2/97	22.6%
Stanislaus	Two-plan	2/97	0.0%
Los Angeles	Two-plan	4/97	39.0%
Napa	COHS	3/98	0.0%
San Diego	GMC	7/98	58.3%
Tulare	Two-plan	2/99	0.0%
Monterey	COHS	10/99	0.0%

Includes date of Medicaid managed care mandate for the 21 counties with a mandate by the end of 1999. Pre-mandate %MC is equal to the percentage of welfare recipients who were voluntarily enrolled in a managed care plan in the month before the mandate took effect.

3. Data and empirical framework

3.1. Medicaid spending and health outcomes data

Medicaid recipients enrolled in a managed care plan typically have no paid fee-for-service claims. It is therefore not surprising that the increase in managed care enrollment has coincided with a decline in the relative importance of fee-for-service payments in the Medicaid program. In 1993, the US$10.44 billion in fee-for-service expenditures accounted for 70% of total Medicaid spending (Table 3). This fraction declined to 56% by 1999, with the corresponding share for capitation payments increasing from 4% to 15%. The first aim of this paper is to determine whether part of the slowdown in Medicaid spending during the last several years (from 16% annually in the 1989–1993 period to less than 5% per year during the next 6 years) was caused by the increase in HMO enrollment.

To do this, I use individual-level expenditure data for a random 20% sample of Medicaid beneficiaries. The California Department of Health Services (DHS) maintains a database that contains all fee-for-service payments made on behalf of each Medicaid recipient. These claims include payments to hospitals, pharmacies, physicians, long-term care facilities, and other types of health care providers. In a typical year, there are more than 150 million fee-for-service Medicaid claims in the state of California. Additionally, DHS tracks every recipient's eligibility for the program in each month, and its eligibility file provides data on whether a recipient is enrolled in a managed care plan or is instead in the fee-for-service system. This eligibility data can be matched to another DHS data source that contains plan-specific reimbursement rates by month and Medicaid eligibility category. I use this information together with the fee-for-service claims to calculate individual-specific Medicaid spending for medical services received by the recipient in each 6-month period from the first half of 1993 until the second half of 1999.[9] The 20% sample includes expenditure data for 2,535,459 individuals with at least 1 month of Medicaid eligibility between January of 1993 and December of 1999.

Once a Medicaid recipient enters a managed care plan, the Medicaid claims data is no longer informative about his health care utilization. It is therefore not possible to identify the effects of HMO enrollment on health care quality without a different source of data. In my analysis of health outcomes, I utilize California's hospital discharge data,[10] which contains detailed information about every hospital discharge in the state during the time

[9] This expenditure data will miss some of the spending categories listed in Table 3. For example, I do not have individual-specific DSH payments, though county-level expenditure specifications that included this information suggest that DSH payments were not significantly affected by the shift to HMOs (Duggan, 2002). Additionally, my expenditure data do not include miscellaneous non-FFS spending nor Medicare buy-ins, but these are paid almost exclusively on behalf of SSI recipients and thus would essentially be zero for the AFDC recipients in my sample. Also, dental payments are not included in my data but these were "carved out" of all managed care contracts and thus should not have been affected. The absence of data on administrative costs is potentially problematic. Conversations with state Medicaid officials suggest that the shift to managed care has, if anything, increased the state's costs of administering the program, because the number of state employees in the fee-for-service branch has not fallen while a new state agency was created to administer the managed care contracts. The fact that administrative costs rose by more than 7% per year from 1993 to 1999 is consistent with this.

[10] See Duggan (2000) for a detailed description of the California's hospital discharge data.

Table 3
California Medicaid expenditures in 1989, 1993, and 1999

Category of spending	1988–1989	1992–1993	1998–1999
FFS provider payments	6939	10439	11140
Capitation payments	477	667	2962
Disproportionate share hospital	0	2054	2154
Miscellaneous non-FFS	94	280	1108
Administration	297	633	971
Medicare buy-in	273	414	827
Dental	147*	479	689
Other and recoveries	− 19	9	− 80
Total	US$8208	US$14,973	US$19,769
Per california state resident	US$281	US$480	US$601

Values are in millions of 1999 dollars.

period of interest. Though I am unable to link a specific hospital patient with a particular Medicaid recipient, I can investigate whether average health outcomes for Medicaid recipients changed in a county following the passage of a managed care mandate there. The specific outcomes used are described below.

3.2. Empirical framework

In the empirical work that follows, I use the presence of a county managed care mandate as an instrumental variable to estimate the average effect of switching a Medicaid recipient from fee-for-service into an HMO. The identifying assumption of this empirical approach is that the mandate is related to government spending and health outcomes only through an effect on HMO enrollment. This assumption would be violated if, for example, counties introduced managed care mandates in response to changes in Medicaid spending or because of changes in the characteristics of their Medicaid recipients. Because the date of each mandate was chosen far in advance by state Medicaid officials,[11] this type of endogeneity seems unlikely to have been present.[12]

While the introduction of the mandates were unlikely to have been affected by changes in a county's Medicaid spending or in the characteristics of its recipients, it is worth pointing out that the counties selected for the mandates are not a random sample of California's 58 counties, but are instead disproportionately large (e.g. 18 of the 20 most populous counties have a mandate while only 3 of the remaining 38 do) and more urban

[11] State legislation passed in 1991 and 1992 made possible the substantial expansion of Medicaid managed care examined in this paper. The GMC model and the April 1994 date was chosen in early 1992 for Sacramento, the first county to move to mandatory Medicaid managed care after the passage of this legislation. At about this same time, 12 counties were selected for the 2-plan model, 5 for the COHS model, and 1 other (San Diego) for GMC (DHS, 1998). Thus, all of the mandate counties, their types of managed care and the approximate dates of the mandates were selected more than 2 years before any mandate took effect (California DHS, 1998).

[12] Recognizing the potential benefits of learning-by-doing, the state Medicaid agency started slowly with the shift to HMOs. Sacramento and Solano were selected first at least partially because they were smaller counties and thus the shift would be less complicated than in some of the later counties (e.g. Los Angeles). Seventeen months elapsed between the second and third mandates (Solano and Orange), but during the subsequent 17 months an additional 11 counties required their recipients to enroll in a plan.

than the average county in this state. Similarly, the type of managed care chosen in each county may not have been purely random. For example, the COHS model was more likely to be adopted in counties with a less competitive HMO industry.

But as long as this non-random assignment of mandates and plan types to counties can be controlled for by including individual fixed effects[13] and county-specific time trends, it will not bias the estimates from specifications of the following type:

$$\text{ManCare}_{jkt} = \alpha_1 + \gamma_1{}^{*}\text{Mandate}_{kt} + \mu_1 X_{jkt} + \theta_{1j} + \lambda_{1t} + t^{*}\rho_{1k} + \varepsilon_{1jkt} \quad (1)$$

$$\text{Spending}_{jkt} = \alpha_2 + \gamma_2{}^{*}\text{Mandate}_{kt} + \mu_2 X_{jkt} + \theta_{2j} + \lambda_{2t} + t^{*}\rho_{2k} + \varepsilon_{2jkt} \quad (2)$$

with j, k, and t indexing individuals, counties, and years, respectively. In these individual-level regressions, the $\text{Mandate}_{k,t}$ variable is equal to the fraction of individual j's eligible months in period t with a mandate in effect. I index this by k rather than j because the policy is varying at the county and not at the individual level. ManCare_{jkt} is equal to the fraction of j's eligible months in which she is actually enrolled in an HMO while Spending_{jkt} is simply Medicaid spending for individual j in period t.

The inclusion of the individual specific fixed effects implies that the parameters γ_1 and γ_2 are essentially being estimated by "switchers"—individuals who were in fee-for-service but then switched to managed care as a result of the mandates. The IV estimate of the effect of managed care enrollment on Medicaid spending is simply the ratio γ_2/γ_1. I will employ a similar strategy to estimate the effect of the shift from fee-for-service to HMOs on health outcomes, though for the reasons mentioned above I will use county averages for Medicaid recipients in this part of the analysis.

4. The effect of HMO enrollment on Medicaid spending

In this section, I utilize individual level Medicaid expenditure data to investigate whether government spending changed significantly following the shift of program participants into HMOs. From January of 1993 to December of 1999, the fraction of California's Medicaid recipients enrolled in an HMO increased from 13% to 51%. As Fig. 4 demonstrates, the increase was even greater for AFDC recipients, who were required to enroll in an HMO in each of the 21 counties with a managed care mandate. While just 20% of welfare recipients in mandate counties were enrolled in an HMO in January of 1993, nearly 85% were by December of 1999. During this same time period, HMO enrollment among welfare recipients in the other 37 counties remained at just 1%.

Because AFDC recipients were differentially affected by the managed care mandates, I focus my empirical work on individuals eligible for Medicaid only through this

[13] County-fixed effects are essentially included because I have individual fixed effects and less than 10% of the sample moves from one county to another in my sample.

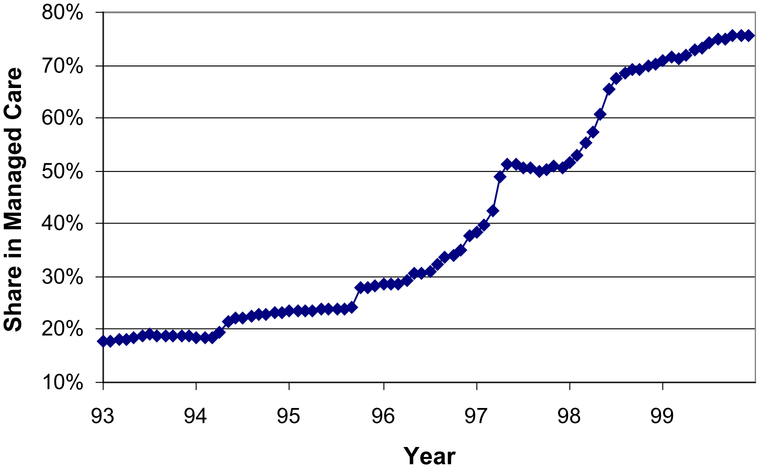

Fig. 4. California TANF Medicaid recipients.

program.[14] Of the 2,535,459 individuals with at least 1 month of Medicaid eligibility between 1993 and 1999, my initial sample consists of 1,208,648 welfare recipients.[15] After excluding the 9445 individuals with data inconsistencies across years (i.e. male in 1993 but female in 1995), I am left with a sample of 1,199,203 Medicaid recipients (Table 4).

An important feature of the Medicaid program is that spell lengths are often quite short and vary substantially across individuals. Fig. 5 shows the distribution of the number of Medicaid eligible months in my sample. More than 25% of the welfare recipients in the sample have 10 or fewer months of Medicaid eligibility and more than half have less than 30 months. There is a "spike" at 84 months of eligibility—for most of these individuals their spell is both right and left-censored. Additionally, some individuals in the sample have a break in eligibility, with 26% having two or more distinct spells during the 84-month time period.

For each individual, I calculate total Medicaid spending in each 6-month period from the beginning of 1993 until the end of 1999. Payments are assigned to time periods based on when the service was delivered rather than when the payments were disbursed. Medicaid spending includes fee-for-service payments to hospitals, physicians, and other health care providers and capitation payments to HMOs. The maximum number of observations for each person is 14, though just 18% of the sample is eligible for Medicaid in every period (Table 5). The total number of observations in the panel data set is equal to

[14] One limitation to focusing on AFDC recipients only is that the shift to managed care may influence utilization by individuals who remain covered by the fee-for-service system. See Baker (1997) for an investigation of the effect of Medicare managed care on the treatment of those who remain in fee-for-service.

[15] Of the remaining 1.34 million people in the 20% sample, 73% have exactly 0 month of eligibility through AFDC with the remaining 27% having some—but not all—of their Medicaid eligibility months due to welfare receipt.

Table 4
Change in managed care penetration resulting from mandates

Type of plan	AFDC		All other	
	1/1993	12/1999	1/1993	12/1999
COHS	28% (n = 54,321)	95% (n = 43,876)	18% (n = 42,962)	81% (n = 45,432)
Two-plan	19% (n = 430,009)	81% (n = 414,532)	3% (n = 252,121)	14% (n = 287,737)
GMC	19% (n = 75,061)	87% (n = 66,342)	4% (n = 35,729)	15% (n = 40,280)
Other 37	1% (n = 72,639)	1% (n = 60,955)	0% (n = 40,865)	0% (n = 45,615)
Total	18% (n = 632,030)	74% (n = 585,705)	5% (n = 371,677)	20% (n = 419,064)

AFDC category includes recipients who are receiving welfare (AFDC or CalWorks, depending on the year) payments, through Section 1931b of Title XIX, or were discontinued from welfare but are still eligible because of the Edwards versus Kizer court order. Some welfare recipients are eligible only through the state (and not the federal) program. All Other category includes all other Medicaid recipients.

8.15 million, which implies that the average number of observations for each individual in the sample is equal to 6.8.

Summary statistics for individuals in the sample are provided in Table 6. As is clear from this table, approximately 65% of the AFDC recipients in the sample are under the age of 18. This makes sense given that there are approximately twice as many children as adults on the AFDC program. Almost three out of every four adult recipients in the sample are female and virtually all of the adult recipients are under the age of 40. More than 58% of the Medicaid recipients in the sample are black or Hispanic, with the remaining 42% consisting primarily of white and Asian individuals.

Average spending for those in the sample in each 6-month time period is equal to US$418 (in 1999 dollars). This is much lower than spending for the average Medicaid

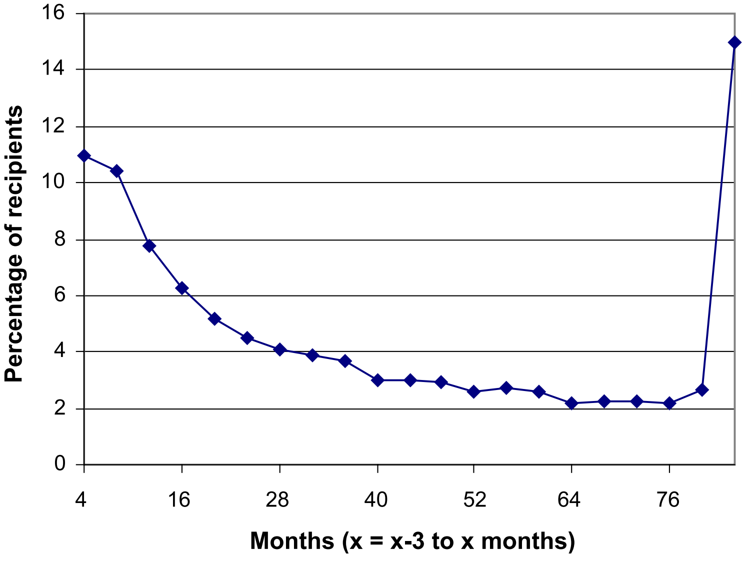

Fig. 5. Months of Medicaid eligibility 1993 – 1999.

Table 5
# of observations for welfare recipients in the sample

# Observations	# Recipients	% of total
1	152,247	12.7%
2	159,618	13.3%
3	113,590	9.5%
4	85,435	7.1%
5	75,975	6.3%
6	67,170	5.6%
7	56,907	4.8%
8	53,707	4.5%
9	51,352	4.3%
10	48,886	4.1%
11	41,070	3.4%
12	39,954	3.3%
13	42,132	3.5%
14	211,160	17.6%
Total	1,199,203	100.0%

Number of half-year observations for each of the 1,199,203 individuals in the AFDC sample. # Observations = t row lists the number of individuals in the sample who have t half-year periods with at least 1 month of Medicaid eligibility.

recipient in California because SSI recipients and other eligibility categories are not included in my sample and are substantially more expensive on average. For example, spending for the average aged, blind, and disabled recipient of the SSI program was more

Table 6
Summary statistics for medicaid sample

Variable	Mean	S.D.
% Female 0–4	0.106	0.307
% Male 0–4	0.108	0.311
% Female 5–17	0.213	0.409
% Male 5–17	0.217	0.412
% Female 18–39	0.201	0.400
% Male 18–39	0.071	0.257
% Female 40+	0.026	0.026
% Male 40+	0.016	0.126
% Hispanic	0.395	0.489
% Black	0.180	0.384
% Asian	0.115	0.319
% White	0.303	0.460
Medicaid spending	418	1663
% Managed care	0.377	0.465
% Mandated	0.382	0.474
% Mandated*voluntary	0.070	0.249
Eligible months	5.4	1.3
% COHS mandated	0.048	0.210
% Two-plan, GMC mandated	0.334	0.461
Periods with mandate	1.22	2.15

Number of observations is 8,151,095 for all variables.

than six times as large as spending for the average AFDC recipient at the beginning of the sample period (Duggan, 2002).

The variable % mandated is equal to the percentage of the recipient's eligible months in the 6-month period in which a mandate is in effect. The mean of this variable (0.382) is approximately equal to the average value of the % managed care variable (0.377), which is equal to the percentage of eligible months in which the recipient is actually enrolled in a plan. It is worth pointing out, however, that the two do not move in lock step. For example in 1993 the % managed care variable has a substantially higher mean than % mandated (0.188 vs. .014) while in 1999 the opposite is true (0.745 vs. 0.892).

The empirical results provided in Table 7 summarize the results from specifications analogous to (1) above. In these regressions, the dependent variable is equal to the fraction of the recipient's eligible months in which he is actually enrolled in an HMO, while the key explanatory variable of interest is the percentage of these eligible months in which he is required to be in an HMO because of a Medicaid mandate in his county of residence. In these regressions, there are 14 time dummies for each of the 6-month periods and 1,199,203 individual-specific fixed effects. The standard errors are corrected to account both for the fact that the policy varies only at the county-time (rather than at the individual) level and for serial correlation in the error term.

The key identifying assumption in these regressions is that the mandate is related to Medicaid spending only through an effect on HMO enrollment. This assumption would be violated if, for example, the timing of the mandate in county j were systematically related to changes in spending that would have occurred in this county, relative to the rest of the state, in the absence of the mandate. It is not possible to rule out this type of legislative endogeneity, though because the date of each mandate varied substantially across counties and was chosen far in advance by the state government, this seems like a reasonable assumption. Furthermore, fee-for-service reimbursement rates for many providers, including physicians and pharmacies, were set at the state, and not at the provider level. This uniformity across market areas limits the potential for policy-makers in the state

Table 7
The effect of Medicaid mandates on managed care enrollment

	% Eligible months in managed care			
	(1)	(2)	(3)	(4)
% Mandated	0.410*** (0.083)	0.486*** (0.084)	0.354*** (0.094)	0.418*** (0.093)
% Mandated∗voluntary		− 0.304*** (0.062)		− 0.253*** (0.050)
Eligible months	0.038*** (0.006)	0.039*** (0.006)	0.039*** (0.006)	0.039*** (0.006)
# Observations	8,151,095	8,151,095	8,151,095	8,151,095
R^2	0.699	0.710	0.714	0.721
Person and time effects?	Yes	Yes	Yes	Yes
County trends?	No	No	Yes	Yes

Dependent variable is equal to the fraction of Medicaid eligible months in the 6-month period during which the recipient is enrolled in a managed care plan. Each regression includes individual fixed effects and 14-year* half effects. Specifications (3) and (4) also include county-specific time trends. Standard errors are clustered by county to account both for the fact that *% mandated* essentially varies only by county-period and for serial correlation in the error term. Regressions are weighted by the number of eligible months for the individual in the year.

government to have forecasted when expenditures would increase in a specific county relative to the rest of California.

The significantly positive coefficient estimate of 0.410 in the first column of Table 7 implies that the relationship between the managed care mandates and Medicaid HMO enrollment is not one-for-one. There are three principal reasons for this. First, in many counties a large fraction of welfare recipients were voluntarily enrolled in a plan just prior to the mandate (see Table 2). These recipients would experience no change in HMO enrollment (though their plans might change) following the mandate. Second, in many cases the full effect of the mandate does not occur immediately. And third, even after a mandate has been in effect for several months, it is often the case that some welfare recipients remain in the fee-for-service system for the reasons described in Section 2 above. Despite this, this first estimate clearly demonstrates that the introduction of the HMO mandates led to a sharp and significant increase in Medicaid HMO enrollment among the AFDC population.

In the second specification, I interact the % mandated variable with an indicator that is equal to one if the person was voluntarily enrolled in a plan in the month before the mandate took effect and zero otherwise.[16] As one would expect, the coefficient estimate for this variable is significantly negative, suggesting that the mandates had a much smaller effect on those already enrolled in a plan than their counterparts who were in the fee-for-service system. Similarly, both the magnitude and the statistical significance of the coefficient estimate for % mandated increase substantially. In specifications (3) and (4), I include county-specific time trends. This reduces the magnitude of both estimates for the % mandated coefficient but both remain statistically significant with *t*-statistics of approximately 4.

In Table 8, I use % mandated as an instrumental variable for the % managed care variable. Thus, the estimate of for the % managed care coefficient in specification (1) is analogous to the γ_2/γ_1 ratio described in section three above. The statistically significant coefficient estimate of 69.5 suggests that the shift from fee-for-service to managed care that resulted from the HMO mandates was associated with a 17% increase in Medicaid spending. This estimate and its statistical precision increases substantially once I control in the second specification for whether the person was voluntarily enrolled in the month before the passage of the mandate. The statistically significant estimate of 97.0 suggests that the average effect of the shift from fee-for-service to managed care was a 23% increase in total Medicaid spending.[17]

One potential concern with this first set of results is that the counties that shifted their Medicaid recipients into HMOs may have had different expenditure trends than their counterparts that retained the fee-for-service system. If this were true, then the first set of results could provide an inaccurate measure of the effect of the mandates even with the

[16] I do not include this main effect separately because it would be perfectly collinear with the individual fixed effect. The Voluntary variable is equal to one for the entire 1993–1999 time period for individuals who were voluntarily enrolled in the month before the mandate took effect in their county—thus, it does not vary within a person.

[17] It appears that the magnitude of this expenditure increase is similar across racial/ethnic groups. For example, I estimated separate specifications similar to (1) for Hispanics, blacks, and all other recipients, and obtained point estimates of 91.9, 96.1, and 73.4, respectively.

Table 8
IV estimates of the effect of managed care enrollment on Medicaid spending

	Medicaid spending for individual *j* in period *t*					
	(1)	(2)	(3)	(4)	(5)	(6)
% Managed care	69.5*	97.0***	94.3**	111.1***	94.6**	112.0***
	(42.1)	(29.9)	(45.6)	(32.5)	(47.4)	(33.5)
% Mandated*voluntary		− 44.8**		− 23.7		− 23.9
		(21.3)		(26.0)		(26.9)
Eligible months	79.0***	78.0***	78.3***	77.6***	78.3***	77.6***
	(1.9)	(1.6)	(2.0)	(1.7)	(2.0)	(1.7)
Periods with mandate					− 1.6	− 3.9
					(6.3)	(6.7)
# Observations	8,151,095	8,151,095	8,151,095	8,151,095	8,151,095	8,151,095
Person and time effects?	Yes	Yes	Yes	Yes	Yes	Yes
County trends?	No	No	Yes	Yes	Yes	Yes
First stage estimate	0.410	0.486	0.354	0.418	0.347	0.408
	(0.083)	(0.084)	(0.094)	(0.093)	(0.091)	(0.091)

Dependent variable is equal to total Medicaid spending for the individual in period *t*. Each regression includes individual fixed effects and 14-year* half effects. Specifications (3) through (6) also include county-specific time trends. Standard errors are clustered by county to account both for the fact that *% mandated* essentially varies only by county-period and for serial correlation in the error term. Regressions are weighted by the number of eligible months for the individual in the year.

inclusion of time and individual-specific fixed effects. Thus, in the next two specifications, I introduce county-specific time trends. In both cases, my estimates for the effect of HMO enrollment on Medicaid spending increases, suggesting that the first set of results is not driven by differences across local market area in Medicaid expenditure trends.

These first four specifications assume that the effect of the mandate does not vary over time. One possible explanation for the sharp increase in Medicaid spending that is implied by my estimates is that the reorganization of the Medicaid program is very costly in the short term but that subsequently costs decline. To test for the presence of this effect, I include a variable periods with mandate that is equal to t if a mandate was implemented in the recipient's county *t* periods ago and zero otherwise. This allows me to differentiate between a level and trend effect of the mandates. Consistent with this hypothesis, the estimates for the periods with mandate variable are negative, though both are insignificant and small in magnitude. This suggests that the significant increase in Medicaid spending persists over time, though there may be a modest decline in the magnitude of this effect after a few years.

Taken together, the results presented in Table 8 strongly suggest that shifting AFDC recipients from fee-for-service into HMOs has increased California's Medicaid spending above what it otherwise would have been. One remaining concern with these estimates is that Medicaid-eligible individuals might choose not to enroll in the program or move to a different county in the state in response to a managed care mandate.[18] Thus, the composition of individuals in the sample would be changing as the mandates took

[18] See Currie and Fahr (2002) for evidence suggesting that Medicaid managed care may influence enrollment in the program and that this effect is especially strong for certain minority groups.

effect. To explore this possibility in specifications not summarized here, I estimated the relationship between the number of AFDC-eligible Medicaid recipients in a county and the % mandated variable. My findings there suggested that there was no significant change in the number of Medicaid eligibles nor in the fraction of recipients who were black or of Hispanic origin. Additionally, when I estimated specifications similar to those above and restricted the sample to individuals who lived in the same county throughout the time period the estimates were virtually unchanged.[19] And, finally, because I include time effects, individual fixed effects, and county-specific time trends in my specifications, I am essentially obtaining my estimates from within-person changes in Medicaid spending. Thus, changes in the composition of Medicaid recipients in mandate counties should not drive the results.

In Table 9, I investigate whether the magnitude of the Medicaid expenditure effect did vary systematically across the different types of managed care mandates. Because there are only two GMC counties, I group them with the 12 two-plan counties, as both of these models allow recipients a choice of plan whereas COHS counties do not. I instrument for managed care enrollment in each type of county using the two variables % COHS mandated and % two-plan/GMC mandated. The sum of these two variables is equal to the % mandated variable defined above, with the first one equal to % mandated for the seven COHS counties and the second equal to % mandated for the other 14 counties with a mandate. Specifications (1) through (6) in Table 9 are analogous to those summarized in Table 8, with the first two including individual and time fixed effects, the second two introducing county-specific time trends, and the last two including the periods with mandate variable.

All six specifications point to the same conclusion—that the average expenditure increase was greater in COHS counties than it was in the two-plan and GMC counties.[20] This is consistent with just one of the three hypotheses outlined above—that the competition in the bidding for managed care contracts kept costs relatively low. It is not consistent with the market power hypothesis, which suggested that COHS plans should be able to spend less because they would have more market power than their two-plan and GMC counterparts when negotiating with health care providers. Nor is it consistent with the administrative costs hypothesis, which predicted a larger expenditure increase in counties that contracted with relatively more plans because of economies of scale in plan administration.

And despite the significant difference across plan types, the results presented in Table 9 demonstrate that both were associated with significant increases in government spending. This undermines the hypothesis that California's shift to Medicaid managed care saved the state money. If anything, it appears that Medicaid spending is significantly higher than it otherwise would have been. Thus, although managed care may have succeeded in

[19] Approximately 10% of the sample had two or more counties of residence while eligible for Medicaid between January of 1993 and December of 1999.

[20] Anecdotal evidence for the largest COHS plan (Cal Optima in Orange County) suggests that Medicaid spending increased both because the plan paid providers substantially more than they had previously received to treat Medicaid patients and because net income was a significant fraction of total capitation revenue for the state. Specifically, the plan pointed out in a recent annual report that its physicians "receive 140% of the Medicaid fee schedule" (Cal Optima, 2000). This same document revealed that the plan earned net income of US$35 million on capitation revenues of US$570 million.

Table 9
IV estimates of effect of managed care enrollment on Medicaid spending by plan type

	Medicaid spending for individual j in year t					
	(1)	(2)	(3)	(4)	(5)	(6)
% Managed care in COHS counties	133.0*** (25.9)	146.6*** (21.2)	186.2*** (45.3)	188.4*** (42.4)	185.4*** (44.2)	191.0*** (40.9)
% Managed care in two-plan, GMC counties	52.7 (42.7)	84.0*** (29.2)	51.5 (48.0)	78.8*** (28.9)	51.7 (49.1)	78.4*** (29.2)
% Mandated∗voluntary		− 45.2** (20.8)		− 26.7 (26.5)		
Eligible months	79.7 (2.1)	78.5*** (1.8)	79.9*** (2.5)	78.8*** (2.0)	79.9*** (2.5)	78.9*** (2.0)
Periods with mandate					0.6 (5.3)	− 2.3 (6.0)
# Observations	8,151,095	8,151,095	8,151,095	8,151,095	8,151,095	8,151,095
Person and time effects?	Yes	Yes	Yes	Yes	Yes	Yes
County trends?	No	No	Yes	Yes	Yes	Yes

Dependent variable is equal to total Medicaid spending for the individual in period t. Two instruments are used to predict the two managed care variables—(% mandated∗COHS county) and (% mandated∗two-plan/GMC county). Each regression includes individual fixed effects and 14-year* half effects. Specifications (3) through (6) also include county-specific time trends. Standard errors are clustered by county to account both for the fact that *% mandated* essentially varies only by county-period and for serial correlation in the error term. Regressions are weighted by the number of eligible months for the individual in the year.

reducing health care spending in the private sector (Cutler et al., 2000), my findings suggest that the opposite is true in the public sector.

While the results presented in this section cast considerable doubt on the hypothesis that managed care is responsible for the slowdown in Medicaid expenditure growth in the nation's most populous state, it says relatively little about the efficiency of the shift. In the next section, I explore whether the increase in HMO enrollment was associated with an observable improvement in health care quality, and then assess the efficiency effects of Medicaid HMO contracting.

5. The effect of HMO enrollment on health outcomes

In this section, I investigate whether the growth in HMO enrollment caused by the Medicaid managed care mandates led to an improvement in health outcomes for the poor. The claims data described above have detailed information about each recipient's health care utilization while in the fee-for-service system, but do not have comparable information once an individual enrolls in an HMO. Because individuals essentially disappear from the claims data once they enroll in an HMO, I use a different data source that provides similar data for Medicaid recipients whether they are in a managed care plan or not. Specifically, I use hospital discharge data for the 1993–1999 period and focus on those patients with Medicaid as their source of insurance.

I am unfortunately unable to link individual-level outcomes data with my Medicaid claims information, and therefore must aggregate outcome measures for Medicaid-eligible individuals to the county level.[21] One consequence of this is that I am unable to restrict the sample to welfare recipients only—the hospital discharge data provide an individual's source of insurance but do not tell whether an individual is eligible for Medicaid through AFDC, SSI, or some other program. Additionally, hospital discharge data will contain information on in-hospital health outcomes only—if for example a Medicaid-insured infant were to die outside of the hospital then this would not be observed in my data. And, finally, measuring health is inherently more difficult than doing the same for Medicaid spending. There are many dimensions of health—some observed and some unobserved—and thus any examination of health outcomes is likely to be to some extent incomplete. Thus, the results presented in this section should be interpreted with more caution than the analogous results presented above for Medicaid spending.

Following the recent literature that examines the effect of managed care enrollment on the health of Medicaid recipients (Levinson and Ullman, 1998; Kaestner et al., 2002), I focus on infant health outcomes. While this is by no means a perfect measure of the change in health associated with the shift to HMOs, it has the advantage that virtually every Medicaid-insured birth occurs in the hospital and thus will appear in my hospital discharge data. A change in, for example, the avoidable hospitalization rate among Medicaid-insured individuals could simply reflect a change in where the treatment is delivered rather than in true health.

From 1993 to 1999, there were 3.73 million births delivered in California's general acute care hospitals, with approximately 45% of these births insured by the Medicaid program. For each 6-month period between early 1993 and late 1999, I use the hospital discharge data to calculate the in-hospital mortality rate for Medicaid-insured infants in each county and the fraction of these newborns born premature.[22] I also calculate the fraction of each county's infants that are insured by Medicaid in each period to explore whether the passage of the mandates was associated with a change in Medicaid coverage. And, finally, I use the average length-of-stay among Medicaid-insured infants to investigate whether managed care plans reduce health care utilization relative to the fee-for-service system.

The results presented in Table 10 shed light on the effect of the mandates on Medicaid coverage, health care utilization, and infant health. Each cell in the second and third columns provides the coefficient estimate from a different specification in which the explanatory variable of interest is equal to the fraction of months in the period that a county had a managed care mandate in effect. All of the specifications include 14 time and 58 county fixed effects, with the specifications summarized in the third column also including 58 country–specific time trend.

The set of results summarized in the first row suggests that the passage of the mandates was associated with a modest, though statistically significant decline in the fraction of infants insured by the Medicaid program. The point estimates of -0.0192 and -0.0215 in the second and third columns, respectively, suggest that the fraction of Medicaid-insured births fell by approximately 2 percentage points. This result is consistent with the findings

[21] The state of California is currently constructing a data set that will enable researchers to perform this individual-level link, but it is not yet available and will not cover the pre-mandate period in any of the 21 counties of interest.

[22] The Medicaid eligibility data suggests that the fraction of Medicaid-eligible infants that are eligible through welfare receipt declines during this period, from 72% in 1993 to 58% by 1999. In specifications not summarized here, I find that this decline does not appear to be related to the passage of managed care mandates.

Table 10
The effect of California's Medicaid Managed care mandates on infant health outcomes

Dependent variable	No county trends	With county trends	μ, σ of dependent variable
% of births Medicaid-insured	− 0.0192*** (0.0054)	− 0.0215*** (0.0060)	0.446 (0.104)
% Medicaid births premature	0.00081 (0.00144)	0.00012 (0.00112)	0.0697 (0.0099)
In-hospital Medicaid IMR	− 0.00019 (0.00027)	− 0.00001 (0.00027)	0.0050 (0.0017)
In-hospital other IMR	− 0.00014 (0.00020)	− 0.00035 (0.00019)	0.0043 (0.0015)
Average Medicaid birth LOS	− 0.018 (0.046)	0.018 (0.040)	2.75 (0.32)

Each cell in the second and third columns contains the coefficient estimate from a different regression of with the explanatory variable equal to the percentage of months that the county had a managed care mandate in effect. The sample consists of 810 county-period observations for the fourteen 6-month periods (January–June or July–December) from 1993 to 1999. Standard errors are reported in parentheses and are clustered by county to account for serial correlation in the error term. Both sets of regressions include county and time effects and are weighted by the number of Medicaid births. Regressions summarized in the third column also include county-specific time trends.

of recent work that suggests the shift to Medicaid managed care reduced enrollment in this program for certain groups (Currie and Fahr, 2002), though because the implied effect is just 2% (from a mean of 45%) it is unlikely to be sufficiently large to cause composition bias in the subsequent specifications.[23]

In the second and third rows, I summarize the results from specifications that explore the effect of the managed care mandates on the fraction of Medicaid infants that are born premature and the fraction that die in the hospital.[24] All four of the coefficient estimates of estimate are statistically insignificant, suggesting that the shift to HMOs did not lead to a substantial improvement in infant health. Similarly, the estimates for the Medicaid-insured infant mortality rate are similar in sign and magnitude to the estimates for non-Medicaid births, which presumably would be unaffected by the Medicaid mandates.

In a companion set of specifications not summarized here, I explore whether the average effect of the mandates in COHS counties was significantly different from the corresponding effect in two-plan and GMC counties. My findings there suggest that the shift to HMOs did not lead to significant improvements in Medicaid infant health in either type of county. This suggests that neither the stronger financial incentive that COHS counties have to keep their recipients healthy nor the incentive that GMC and two-plan counties have to avoid unprofitable (and perhaps unhealthy) customers has a significant effect on health care quality.

In the final row, I examine the relationship between health care utilization and the average number of days that Medicaid-insured infants stay in the hospital. If fee-for-service reimbursement leads to excessive utilization, then one would expect to find a significant decline given the HMOs' financial incentives to reduce payments to hospitals and other health care providers. But the statistically insignificant estimates for the mandate variable suggest that HMOs have not reduced utilization for Medicaid-eligible infants.

[23] In separate specifications not summarized here, I explore whether the percentage of Medicaid-insured infants that are black or of Hispanic origin is significantly related to the mandate variable. My findings suggest that Medicaid enrollment did not decline differentially for these two groups.

[24] More than 75% of infant deaths in the state of California occur in the hospital.

Taken together, the results presented in this section suggest that shifting Medicaid recipients from fee-for-service into managed care has not improved infant health. While there are no doubt other dimensions of health that could have been affected, this is the one that can be most accurately measured with the available data and is arguably the most important one for the AFDC population.

6. Discussion

During the 1990s, the fraction of Medicaid recipients in the state of California enrolled in HMOs increased from less than 12% to more than 51%. The results presented in this paper demonstrate that the increased reliance on HMOs led to a substantial increase in government spending and suggest that health outcomes for the poor did not improve. It therefore appears that requiring millions of California's Medicaid recipients to switch out of the fee-for-service system and enroll in HMOs did not lead to an improvement in the efficiency of this government program.

Do the results for welfare recipients generalize to other Medicaid beneficiaries or to Medicaid programs in other states? Because the mandates differentially affected low cost Medicaid recipients, it is certainly possible that the impact for more expensive program participants with a different set of health conditions would not be similar. Additionally, fee-for-service Medicaid reimbursement rates in California are lower than those in the typical state. Thus, it is possible that there is a greater chance of reducing government spending while simultaneously improving quality by contracting with HMOs in other state Medicaid programs.

But if policy-makers chose not to require other Medicaid recipients (e.g. the aged, blind, and disabled receiving SSI) to enroll in a plan because they accurately forecasted that the efficiency effects for these other groups would be less favorable, then the results presented here may understate the extent to which HMO contracting would reduce program efficiency. Furthermore, because California's HMO market is the most mature in the nation, the managed care organizations in this state are presumably more efficient than the typical HMO. It is therefore ambiguous whether Medicaid HMO contracting would be more or less efficient in other states.

For two reasons, one may expect HMO contracting to be even less effective in the Medicare program. First, because recipients of this program have the option both to enroll in and to drop out of an HMO, managed care organizations may find it more profitable to select healthy enrollees (conditional on observable characteristics) rather than to improve health. Second, the extent of demand-side cost sharing is much greater for fee-for-service recipients of this program than for their counterparts in Medicaid. Thus, the fraction of expenditures that have little value to the beneficiary is likely to be lower in Medicare.

The projected increases in public medical spending along with the deteriorating health of federal and state budgets may increase policy-maker interest in contracting with HMOs. The results presented in this paper suggest that private managed care plans are unlikely to deliver cost savings to federal and state governments without reducing health care quality for Medicare and Medicaid recipients.

7. Uncited reference

Dafny and Gruber, in press

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