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# MEDICAL LIABILITY, MANAGED CARE, AND DEFENSIVE MEDICINE

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## ABSTRACT

Because the optimal level of medical malpractice liability depends on the incentives provided by the health insurance system, the rise of managed care in the 1990s may affect the relationship between liability reform and defensive medicine. In this paper, we assess empirically the extent to which managed care and liability reform interact to affect the cost of care and health outcomes of elderly Medicare beneficiaries with cardiac illness. Malpractice reforms that directly reduce liability pressure -- such as caps on damages -- reduce defensive practices both in areas with low and with high levels of managed care enrollment. In addition, managed care and direct reforms do not have long-run interaction effects that are harmful to patient health. However, at least for patients with less severe cardiac illness, managed care and direct reforms are substitutes, so the reduction in defensive practices that can be achieved with direct reforms is smaller in areas with high managed care enrollment. We consider some implications of these results for the current debate over the appropriateness of extending malpractice liability to managed care organizations.



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## Introduction

What is the appropriate medical liability policy in an era of managed care? Despite the fact that this question has been at the center of recent debates about the regulation of managed care plans, little direct empirical evidence exists to help answer it. Substantial evidence largely predating the recent growth of managed care in the United States suggests that doctors practice defensive medicine; that is, they administer precautionary medical treatments that have minimal expected medical benefit out of fear of legal liability. In our previous work focusing on data from the late 1980s (Kessler and McClellan 1996), we showed that elderly patients with cardiac illness from states adopting tort reforms that reduced liability (such as caps on malpractice awards) experience lower growth in medical expenditures and intensity of treatment, but do not experience significantly worse health outcomes. Put another way, for an important category of patients, tort reforms appear to improve health care productivity: they reduce medical expenditures without affecting health status.

Moral hazard from health insurance may be an important explanation for these findings, as well other causes of the socially excessive use of medical services more generally. Under traditional fee-for-service (FFS) health insurance, neither patients nor physicians bear the full social costs of medical care in any particular case. Because physicians compare their own liability costs to a fraction of the social marginal costs of precaution, an FFS environment would be expected to encourage defensive practices.

But in an era of managed care insurance, high-powered payment incentives and regulation of physician practices may reduce the scope for physicians to provide such low-valued care. There is growing evidence that increasing penetration of managed care in the 1990s has reduced

the use of some treatments that are likely to have little medical benefit (e.g., Baker 1999; Cutler and Sheiner, 1999; Kessler and McClellan 1999b). However, no previous work has assessed empirically the extent to which the rise of managed care has affected the prevalence of defensive medicine, and thus the impact of reforms affecting malpractice liability.

Estimates of how liability reform and managed care interact to affect treatment decisions and patient health outcomes can inform two current policy issues about the appropriate level and form of medical liability in the presence of managed care. First, these estimates can indicate whether estimates from earlier studies of the social benefits of liability reform remain valid. Have more parsimonious practices associated with managed care reduced physicians' incentive and ability to engage in defensive treatment, making the policy question about liability reform moot? Has managed care increased the benefits from liability reform? Or, has managed care made liability reform socially harmful? Second, these estimates can inform the debate over whether malpractice liability should be expanded to health insurers and managed care organizations (MCOs). Current federal U.S. law -- the Employee Retirement Income Security Act (ERISA) -- preempts certain malpractice liability claims against MCOs. Should ERISA preemption be repealed or modified? In addition, several states have passed recent legislation that seeks to expand liability for MCOs within the constraints of ERISA. Are these state-law expansions of liability socially beneficial?

Despite an extensive literature in the fields of law and policy emphasizing the theoretical ambiguity of the interactions between managed care and medical liability (e.g., Bearden and Maedgen 1995, Daly 1995, Frankel 1994, O'Connell and Neale 1998, Pedroza 1996, Sage 1997), no previous work has assessed empirically the relationships between liability pressure, managed

care, medical treatment intensity, health care costs, and patient health outcomes. In this paper, we analyze updated populations of elderly Medicare beneficiaries hospitalized for treatment of a new heart attack (acute myocardial infarction, or AMI) or of new ischemic heart disease (IHD) from 1984-1994, matched with information on tort laws and managed care enrollment rates from the state in which the patient was treated. We study the direct effects of liability reforms and managed care, and the interaction between reforms and managed care, on total hospital expenditures on the patient in the year after AMI or IHD to measure intensity of treatment. We also model the effects of law reforms and managed care on important patient outcomes. We estimate the effect of reforms and managed care on a serious adverse outcome that is common in our study population: mortality within one year of occurrence of the cardiac illness. We also estimate the effect of reforms and managed care on two other common adverse outcomes related to a patient's quality of life: whether the patient experienced a subsequent AMI or heart failure requiring hospitalization in the year following the initial illness. Such empirical evidence is essential in light of the range of possible effects that managed care and liability reform may have on treatment decisions, health care costs, and health outcomes – and ultimately social welfare.

We proceed in four sections. Section I discusses the theoretical ambiguity of the interactions between liability reform and managed care. It offers a framework for analyzing these interaction effects, and illustrates that, in the presence of managed care, liability reform may be irrelevant, constructive, or harmful from the perspective of social welfare. Section II describes our empirical model and data sources. Section III presents our empirical results. Section IV concludes the paper with an outline of the potential implications of our results for policy, and some of the limitations of our analysis.

## I. Managed Care and the Optimal Liability System

From a theoretical standpoint, the optimality of malpractice reform depends on the objectives and incentives of health care providers – in particular the incentives created by the health insurance environment in which the providers practice – and the extent to which the liability system identifies negligent behavior and imposes penalties accurately. If providers always act as perfect agents for patients, then malpractice pressure would be unnecessary to create incentives for due care in their treatment decisions. In this case, the usual moral hazard inherent in all health insurance -- arising out of the fact that neither patients nor physicians generally bear the full cost of their treatment decisions at the time the decisions are made -- would lead to socially excessive levels of care.

But providers are not perfect agents for patients. Physicians may seek to maximize a weighted sum of their utility and patient health, and physician effort in taking care to avoid negligent medical injury may not be fully compensated. And, the malpractice system does not necessarily align precisely providers' incentives with patients' interests. On one hand, physicians may bear less than the social costs of accidents. Weakly experience-rated malpractice liability insurance, for example, may partially insulate physicians and hospitals from the financial consequences of their care decisions. In addition, physicians only bear substantial costs of accidents when patients file claims, and patients may not file a malpractice claim in response to every negligent medical injury (Harvard Medical Practice Study 1990). On the other hand, physicians may bear more than 100 percent of the social costs of accidents, due to mistakes in assigning negligence and attributing causality, high transaction costs, and the significant uninsured expenses imposed by the liability system (see Kessler and McClellan 1996, 1997 for

discussion). Thus, the optimal level of malpractice liability in practice is an empirical question. Depending on the influence of competing distortions to the costs of accidents and the costs of precaution faced by providers, they may take too little care, or practice "defensive medicine" – provide additional treatments with costs in excess of their value.

Our previous empirical work (Kessler and McClellan 1996, 1997, 1999a) and that of other investigators (e.g., Dubay et al. 1999) suggests that doctors have historically responded to greater malpractice liability pressure by providing more intensive services that have minimal medical benefit. We found that reforms which directly limited malpractice liability, for example by capping damage awards, reduced medical expenditures for elderly patients with heart disease but did not have any substantial consequences for important health outcomes. In this population, liability reform improved the efficiency of care.

By the mid-1990s, however, the supply-side incentives used by managed care plans had increased the costs of incremental care decisions borne by physicians (and other providers). These costs include uncompensated time and unpleasantness (e.g., having to provide detailed written justification and obtain insurer approval for a procedure to be reimbursed) and long-term financial penalties (e.g., being dropped from a plan). To the extent that the rise of managed care created more tension for physicians between patient preferences for additional treatments with any positive marginal benefit on the one hand, and the additional costs imposed by plans on the other, it may have altered the relationship between malpractice liability pressure and the optimality of care. Managed-care penetration has now risen to high levels in much of the United States (Iglehart, 1999), and so understanding how managed care and provider liability reforms interact is an important question for designing health policy today. More generally,

understanding these interaction effects will be key to predicting how the effects of changes to the liability system will respond to increasing efforts at health care cost control.

Despite large theoretical and empirical literatures on the effects of both malpractice reform and managed care, no previous studies have examined the joint effects of these changes in health care markets. This is a somewhat surprising gap, since proposals to reform malpractice liability in the wake of managed care growth have garnered considerable attention as a critical mechanism for reducing perceived abuses of managed care. Whether reforms to limit provider liability increase social welfare in the presence of managed care depends in part on whether malpractice reforms and managed care are substitutes, complements, or independent influences on provider behavior. If more parsimonious practices resulting from managed care incentives reduce physicians' provision of additional "defensive" treatments that would otherwise result from malpractice liability concerns, then they are substitutes. For example, both managed care and malpractice reforms may discourage physicians from ordering additional diagnostic procedures with costs greater than expected benefits. In this case, managed care and liability reforms reduce wasteful treatment decisions on the same margins, and malpractice reforms will have more modest effects on treatment intensity as the incentives provided by health insurance become higher-powered.

Managed care and liability reforms might have independent effects, to the extent they reduce socially-inefficient practices in different ways. For example, liability reform might discourage unnecessary diagnostic procedures that are likely to be the subject of litigation if a patient has an adverse outcome, while managed care might discourage therapeutic procedures that are not often the subject of litigation but have low expected value. Finally, it is also

possible that malpractice reform and managed care are complements, reinforcing each others' effects. In addition to affecting utilization, managed care may improve coordination and integration of care across providers. In this context, as we discuss below, managed care might also make it easier for multiple potential defendants in a case (e.g., an internist, a specialist, and a hospital) to intensify their defensive practices in response to liability pressure.

As long as malpractice reforms and managed care are not perfect substitutes for each other, the effect on treatment of implementing both of these changes in health care markets will be larger than the effect of implementing either change alone. Thus, it is possible that these changes together could have adverse consequences for outcomes and possibly social welfare, even though the existing literature provides little evidence of adverse effects of either change alone.

A second and related policy issue involves the extension of liability to managed care organizations (MCOs). Supporters of such reforms argue that, since the MCOs are creating incentives for providers to reduce intensity of care, they are appropriate targets of liability. By the end of the 1990s, even though such liability expansions have been actively considered in many states as well as at the Federal level, only a few states (California, Georgia, Missouri, and Texas) have recently implemented any significant MCO liability. However, because they too influence the overall level of liability pressure in health care production, our experiences with existing liability reforms can provide some guidance for evaluating the likely consequences of these largely untested reforms.

To address the gap in empirical evidence on the likely effects of malpractice reforms in an era of managed care, we study how changes in the legal environment of states interact with

changes in state-level managed care enrollment rates to affect medical expenditures and health outcomes. By measuring the social costs and benefits of treatment undertaken as a joint result of liability pressure and the medical practice environment, we provide direct evidence on the efficiency of different types of liability regimes in different types of health care markets.

## II. Models and Data

*Models*

Our modeling strategy and data are consistent with those used in Kessler and McClellan (1996). Our statistical methods seek to measure the effects of changes in identifiable sources of influences on medical decision making -- state tort laws and area average managed care enrollment rates -- that are not related to unobserved heterogeneity across patients and providers. We compare time trends across states reforming and not reforming their liability systems during the eleven-year period 1984-1994 (four years longer than in our previous analysis) in inpatient hospital expenditures, and in outcome measures including all-cause mortality as well as the occurrence of cardiac complications directly related to quality of life. We model average expenditures and outcomes as essentially nonparametric functions of patient demographic characteristics; state-level legal, political, and health-care market characteristics; and state- and time-fixed-effects. We model the effects of state tort law changes as differences in time trends before and after the tort law changes. We model the market-wide or spillover effects of managed care only, by measuring the effect of area-average enrollment rates on Medicare beneficiaries not

enrolled in a managed care plan.[1] We allow the effect of law changes to vary in states with low versus high rates of managed care enrollment. As in our previous work, we test for the existence and magnitude of defensive medicine based on how law reforms affect medical expenditures and health outcomes.

While this strategy fundamentally involves differences-in-differences between reforming and nonreforming states to identify effects, we modify conventional differences-in-differences estimation strategies in several ways. First, as noted above, our models include few restrictive parametric or distributional assumptions about functional forms for expenditures or health outcomes. Second, we allow managed care and law reforms to have dynamic effects on treatment decisions, health care costs, and health outcomes. By using a panel dataset including the most recent information, our modeling framework permits a more robust analysis of the effects of liability reform and managed care.

We use a panel-data framework with observations on successive cohorts of heart disease patients. In state s = 1...S during year t = 1...T, our observational units consist of individuals $I=1...N_{st}$ who are hospitalized with new occurrences of particular illnesses such as a heart attack. Each patient has observable characteristics $X_{ist}$, which we describe as a fully-interacted set of binary variables, as well as many unobservable characteristics that also influence both treatment decisions and outcomes. The individual receives treatment of aggregate intensity $R_{ist}$, where R denotes total hospital expenditures in the year after the health event. The patient has a health outcome $O_{ist}$, possibly affected by the intensity of treatment received, where a higher value

[1]Throughout the period of our analysis and even today, the vast majority of Medicare beneficiaries remain in the "traditional" fee-for-service Medicare program. For example, in 1994, less than 10% of beneficiaries were enrolled in managed care plans (HCFA, 1999).

denotes a more adverse outcome (O is binary in our models).

We define state laws and market conditions in effect at the time of each individual's health event with five categorical variables. Table 1 summaries the eight types of state medical malpractice liability law reforms that we analyze: caps on damage awards, abolition of punitive damages, no mandatory prejudgment interest, collateral-source rule reform, caps on contingency fees, mandatory periodic payments, joint-and-several liability reform, and the existence of a patient compensation fund. Consistent with our other research and with previous research on the impact of liability reform (see Kessler and McClellan 1996, 1997, 1999a for discussion), we group these reforms into two categories: direct and indirect reforms. Direct reforms include changes in laws which specify statutory limits or reductions in malpractice awards: caps on total or noneconomic damages, collateral source rule reforms (which require damages to be reduced by all or part of the dollar value of collateral source payments to the plaintiff), abolition of punitive damages, and abolition of mandatory prejudgment interest. Indirect reforms include changes that affect awards only indirectly, such as reforms imposing mandatory periodic payments (which require damages in certain cases to be disbursed in the form of an annuity that pays out over time), caps on attorneys' contingency fees, and abolition of joint-and-several liability for total or noneconomic damages, either for all claims or for claims in which defendants did not act in concert.

To distinguish long-term from short-term effects of law reforms, we estimate dynamic models that separate the effect of reforms soon after and long after their adoption. We denote the existence of reforms adopted during our study period using four binary variables $L_{dst}$: $L_{1st}$=1 if state s adopted a direct reform between year t-2 and year t (no more than two years before the

patient's year t health event), $L_{2st}$=1 if state s adopted a direct reform in year t-3 or before (three or more years before the patient's health event), $L_{3st}$=1 if state s adopted an indirect reform between year t-2 and year t, and $L_{4st}$=1 if state s adopted an indirect reform in year t-3 or before . $L_{st} = [L_{1st}\ L_{2st}\ L_{3st}\ L_{4st}]$ is thus a four-dimensional binary vector describing the existence of malpractice reforms. We characterize the extent of the influence of managed care in state health care markets using a binary variable $M_{st}$, $M_{st}$ = 1 if state s had above-median managed care enrollment (exclusive of Medicare enrollees) in its nonelderly population at time t.[2]

We first estimate linear models of average effects of reforms and area managed care coverage on log(expenditures) and health outcomes:

$$\ln(R_{ist}) = \theta_t + \alpha_s + X_{ist}\beta + W_{st}\gamma + L_{st}\varphi + M_{st}\delta + v_{ist}\ , \qquad (1)$$

where $\theta_t$ is a time fixed-effect, $\alpha_s$ is a state fixed-effect, $W_{st}$ is a vector of variables described in Kessler and McClellan (1996) which summarize the legal-political environment of the state over time,[3] $\beta$ and $\gamma$ are vectors of the corresponding average-effect estimates for the demographic controls and additional state-time controls, $\varphi$ is the average effect in the short and long run of

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[2]We measure the influence of managed care with nonelderly/non-Medicare enrollment rates because (1) the vast majority of managed care enrollment in a market is generally in the nonelderly market, and (2) Medicare HMO enrollment rates are correlated with Medicare FFS expenditure levels across areas and over time as a result of Medicare's method of paying Medicare managed care plans. Historically, Medicare has paid HMOs on the basis of area average expenditures, which would induce a positive correlation between Medicare FFS expenditures and Medicare HMO enrollment rates in the elderly population, even in the absence of any causal spillover effect of managed care on treatment decisions or health care costs. This is obviously not true of nonelderly managed care market shares.

[3]W includes all the variables discussed in Kessler and McClellan (1996) except lawyers per capita, because that information was not available for the 1990s.

direct and indirect malpractice reforms, $\delta$ is the effect of above-median (versus below-median) managed care enrollment, and $v_{ist}$ is a mean-zero independently-distributed error term with $E(v_{ist} | X_{ist}, L_{st}, W_{st}, M_{st}) = 0$. Because legal reforms may affect both the level and the growth rate of expenditures, we estimate different baseline time trends $\theta_t$ for states adopting direct and indirect reforms before 1985 (which generally adopted before 1980) and nonadopting states. Our dataset includes essentially all elderly patients hospitalized with the heart diseases of interest for the years of our study, so that our results describe the actual average differences in trends in the U.S. elderly population. We report standard errors for inferences about average differences that might arise in potential populations (e.g., elderly patients with these health problems in other years). Our model assumes that patients grouped at the level of state/year level have similar distributions of unobservable characteristics that influence medical treatments and health outcomes after controlling for state and time fixed effects.

Simple average effect estimates of the impact of managed care and liability reform may neglect important interactions between these determinants of medical treatment decisions; liability reforms may be either complements to or substitutes for the market effects of managed care. The effects of managed care may also vary over our sample period (e.g., Kessler and McClellan 1999b). For this reason, we estimate unconstrained models that allow the effect of managed care to vary year-by-year, and allow the effect of direct and indirect reforms to vary in different managed care market environments:

$$\ln(R_{ist}) = \theta_t^A + \theta_t^B * M_{st} + \alpha_s + X_{ist}\beta + W_{st}\gamma + L_{st}\varphi + (L_{st} * M_{st})\rho + v_{ist} , \qquad (2)$$

where $\rho$ is the interaction effect between liability reform and managed care.

*Data*

The data used in our study come from three principal sources. First, we use comprehensive longitudinal Medicare claims data for the vast majority of elderly beneficiaries who were admitted to a hospital with a new primary diagnosis of heart attack (AMI) or IHD in every year 1984-1994. We exclude patients in Medicare HMOs (reliable individual-level treatment information on such individuals was not available until recently).[4] Data on patient demographic characteristics were obtained from the Health Care Financing Administration's HISKEW enrollment files. Patients with admissions for the same illness in the prior year were excluded to insure that we examine only new occurrences of illness. Measures of one-year hospital expenditures were obtained by adding up all acute plus nonacute hospital reimbursements (including copayments and deductibles not paid by Medicare) from insurance claims for all treatments in the year following each patient's initial admission for AMI. These expenditures reflect variation in actual resource use even under the DRG-based Medicare Prospective Payment System, since the provision of intensive treatments, very costly stays, transfers, and readmissions for rehabilitation or further acute care all lead to higher expenditures.

We examine three measures of health outcomes. We calculate mortality rates within one year of the index AMI admission with death dates based on death reports validated by the Social Security Administration. Measures of the occurrence of cardiac complications were obtained by abstracting data on the principal diagnosis for all subsequent admissions (not counting transfers

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[4]As noted above, enrollment rates in Medicare HMOs were relatively low. Further, to the extent that Medicare beneficiaries in HMOs are healthier than those enrolled in FFS Medicare (and Medicare HMO enrollment is positively correlated with non-Medicare HMO enrollment), this omission modestly biases our results toward finding that area HMO enrollment leads to higher Medicare costs and worse health outcomes.

and readmissions within 30 days of the index admission) in the year following the patient's initial admission. Cardiac complications included rehospitalizations within one year of the initial event with a primary diagnosis (principal cause of hospitalization) of either subsequent AMI or heart failure. Treatment of AMI patients is intended to prevent subsequent AMIs if possible, and the occurrence of heart failure requiring hospitalization is evidence that the damage to the patient's heart from ischemic disease has serious functional consequences.

Table 2 describes the elderly populations with AMI and IHD from selected years of our study. Table 2 demonstrates some of the well-known trends in the treatment, expenditures, and outcomes of elderly heart disease patients. The first row of the Table shows how dramatically real Medicare inpatient expenditures have grown over the 1984-1994 period. Because reimbursement given treatment choice for Medicare patients did not increase over this period (McClellan 1997), these expenditure trends are attributable to increases in intensity of treatment. The more rapid growth since 1990 was largely attributable to increasing use of nonacute inpatient services, reflecting general trends in Medicare expenditures. Concomitant with this increase in average intensity, average one-year mortality for AMI has declined by 7.4 percentage points. However, trends in cardiac complications have been mixed: AMI and IHD survivors have a slightly higher risk of subsequent heart failure (CHF), but have lower rates of subsequent AMI. For all the years of our study pooled together, the sample of heart attack patients includes 2,466,801 individuals; the sample of IHD patients includes 3,823,990 individuals.

Second, we match patient data with information on state liability reforms from our previous research (Kessler and McClellan 1997), updated to include adoption and repeal of reforms through 1994. Table 3 presents the chronology of legal reforms through 1994 that we

analyze for each of the 50 states. The table shows that a number of states have implemented legal reforms at different times. For example, 23 states adopted direct reforms over our 1984-1994 study period; 24 states adopted indirect reforms. Furthermore, a substantial number of states do not overlap in their adoption of policies; although 33 states adopted either direct or indirect reforms, only 14 adopted both.

Third, we match patient data with information on annual managed care enrollment rates by state from InterStudy Publications, a division of Decision Resources, Inc. Managed care enrollment excludes patients enrolled in preferred provider organizations (which are effectively a form of discounted FFS insurance); point-of-service plans that are not subject to state HMO regulation; and plans that are self-insured by employers, even if they are administered by a MCO. At least through the early 1990s, enrollment rates in these forms of managed care were highly correlated with the InterStudy measures. Enrollment rates were calculated by dividing the number of enrollees (exclusive of Medicare enrollees) by the nonelderly population. In order to investigate the extent to which the rate of managed care enrollment in an area interacts with hospital market structure, we separate states into two groups based on whether their HMO enrollment was above or below the 1984-94 overall median rate, 7.1%, for each year of our analysis. Table 4, which shows the classification of states for selected years, demonstrates the growth in states with above-median managed-care penetration over the study period.

## III. Empirical Results

Table 5 presents estimates of the effect of liability reforms and state managed care enrollment rates on treatment intensity and health outcomes for our populations of AMI and IHD

patients. In this and subsequent models, we include fully-interacted demographic effects -- for patient age (65-69, 70-74, 75-79, 80-89, 90-99), gender, black or nonblack race, and urban or rural residence -- state fixed-effects; time fixed-effects that vary depending on the states' preexisting liability enviroment; and time-varying controls for states' political and regulatory environment. As described in Section II, all of our specifications are linear, the dependent variable in the expenditure models is logged, and all coefficient estimates are multiplied by 100 and so can be interpreted as average effects in percent (for expenditure models) or percentage points (for outcomes models).

The first row of Table 5 confirms the findings from Kessler and McClellan (1996): even controlling for managed care enrollment rates, there is still evidence that doctors practice defensive medicine. In the long run (three or more years after the adoption of reforms), patients from states adopting direct reforms have significantly lower growth in medical expenditures for both AMI and IHD, but do not have statistically significantly greater increases in the rate of adverse outcomes for their illness. Especially for IHD patients, the estimates in Table 5 are smaller in magnitude than those reported in Kessler and McClellan (1996), Table 6. We consider the reasons for the differences below. Table 5 reports that direct reforms decreased long-run hospital expenditures on AMI patients by approximately 4.2 percent (compared to an estimated effect of 5.8 percent from Kessler and McClellan (1996)); similarly, direct reforms decreased long-run hospital expenditures on IHD patients by approximately 4.4 percent (compared to an estimated effect of 8.9 percent from Kessler and McClellan (1996)). Indirect reforms do not have a substantial or systematic long-run effect on expenditures or outcomes. The precision of the estimates is much greater than in our previous work, reflecting the fact that the current

research analyzes the consequences of all elderly beneficiaries with cardiac illness for all of the years 1984-1994.

The last row of the Table shows that the spillover effects of managed care, as measured by enrollment per capita, have a statistically significant negative impact on treatment intensity, but no statistically significant positive impact on adverse health outcomes. Among IHD patients, high levels of managed care enrollment not only lead to larger reductions in expenditures but also to statistically significantly lower rates of cardiac complications (although the magnitude of the reduction, 0.13 percentage points for recurrence of AMI, is small). These findings are consistent with previous research on the effects of managed care on expenditures and outcomes, such as Baker (1999) and Kessler and McClellan (1999b).[5]

Table 6 presents estimates of equation (2), allowing the effect of malpractice reforms to vary in high- and low-managed-care market environments. In all market environments, for both AMI and IHD patients, direct reforms lead to long-run reductions in medical expenditures without substantial consequences for patient health outcomes. Among AMI patients, direct reforms in environments with low managed-care penetration lead to statistically significant long-run increases in AMI readmission rates, and indirect reforms lead to significant decreases in AMI readmission rates. However, both of these effects are small in magnitude (i.e., 95% confidence interval is less than a one percentage-point effect), and the adverse effects of direct reforms on patient health are not present in areas with high managed care enrollment. Coupled with the estimated expenditure effect, the point estimate for the long-run expenditure/benefit ratio for a

[5] Aside from Kessler and McClellan (1999b), however, little previous work has jointly examined managed care and other economic and regulatory factors that may influence its effect, as we do here.

higher-pressure liability regime in a low-managed-care environment is well over $130,000 per year of better cardiac health (e.g., without readmission for a recurrent AMI).[6] Among IHD patients, the the estimated effects on outcomes are all insignificant and generally smaller in magnitude.

In high managed-care environments, the long-run effect of reforms on expenditures for AMI are smaller in magnitude than but not statistically different from the effect in low-managed-care environments. These results imply that malpractice reforms and managed care do not have large substitutable or complementary effects on overall resource use for AMI patients; most of the long-run independent expenditure-reducing effects of managed care spillovers and direct reforms can jointly be achieved. Among IHD patients, however, managed care and direct reforms are substitutes. Significantly less additional cost savings among IHD patients are achieved by managed care once direct reforms are in place. The magnitude of this interaction between managed care and reform is approximately equal to the average effect of managed care enrollment from Table 5. In low-managed-care environments, the estimated independent effect of direct reforms on IHD expenditures is approximately 7.1 percent; in high managed care environments, the estimated independent effect is approximately 3.9 percent. Not surprisingly, for both AMI and IHD patients, the estimated effects of direct reforms in low managed-care areas more closely resemble those reported in Kessler and McClellan (1996), which were obtained on

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[6]That is, if we directly apply the estimates from Table 6 to form a cost-effectiveness ratio based on the average expenditure per AMI patient in 1994, we have (.038*$18,079)/.0051 = $134,706. Note that this is likely an underestimate of the cost-effectiveness ratio of reform-induced treatment in low managed care areas, since our conversion from the percentage effect of malpractice reform in the log model to the average effect in levels potentially understates effects for high-cost cases on the average in levels (see, e.g., Manning et al.,1987).

an earlier sample in which managed care was less prevalent and influential.

The estimates in Table 6 suggest that managed care and indirect reforms have complementary effects on medical treatment intensity, at least for patients with IHD. However, the estimated effects of managed care and indirect reforms masks substantial heterogeneity in the interaction effects for particular types of indirect reforms. Estimates from supplementary IHD models (not presented in Table 6) that disaggregate indirect reforms into two groups, joint and several liability reforms and all other indirect reforms, show that managed care and joint and several liability reforms are complements, whereas managed care and all other indirect reforms are substitutes. This effect is consistent with distinctive features of joint and several reforms, which may have a particularly large effect on liability-induced treatment behavior in environments with greater coordination and integration of care.[7]

The lower level of disease severity generally found among IHD relative to AMI patients is consistent with the differences in our estimates for the two populations. In IHD relative to AMI patients, both direct reform and managed care have greater independent effects on treatment

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[7]In particular, the distinctive nature of joint and several liability may lead to unique interactions with characteristics of the health care market environment. Joint-and-several liability means that a malpractice plaintiff can sue any physician or hospital who played a role in causing his medical injury and recover the full extent of his damages from each, regardless of the extent of the individual defendant's fault. If managed care supports better coordination and integration of care among providers, it may lead to more use of defensive practices by multiple doctors and hospitals to reduce the costs of joint-and-several liability that they bear individually. In fee-for-service markets with less coordination of care, doctors and hospitals may have more difficulty in undertaking joint defensive practices that reduce their collective liability. In addition, in unintegrated markets, much of the savings in joint and several liability costs from an individual provider's defensive practices accrue to other providers. Integration of markets through managed care could help solve the "collective action problem" that prevents an individual doctor or hospital from capturing the full savings in joint and several liability costs that defensive practices can provide.

intensity, but not a substantially greater joint effect. Because a larger share of IHD patients are likely to have less severe illness and thus more "marginal" indications for many intensive treatment, the scope for defensive practices is likely to be greater, leading to larger average effects of managed care and direct reforms, at least in low-managed-care environments. However, the more parsimonious practices associated with managed care are also more likely to reduce physicians' incentives and ability to provide intensive treatments for "marginal" IHD cases, and therefore to reduce the magnitude of the effects of liability reform.

## IV. Conclusion

Previous research based principally on data from the 1980s has shown that reforms limiting medical malpractice liability lead to statistically and economically significant reductions in medical expenditures among Medicare beneficiaries, but not to significant increases in rates of adverse health outcomes. These results imply that doctors practice defensive medicine, and that marginal reductions in liability from a maximal level improve productivity in health care. Since there is substantial evidence that expenditures and perhaps the utilization of marginally-valuable treatments has declined with the growth of managed care since the 1980s, the results from early studies assessing the social implications of medical liability reform may no longer be valid. Because the magnitude and even the direction of the interaction effects between managed care and liability pressure are theoretically indeterminate, the social implications of liability reform in the present and the future – in which managed care will play an important role in shaping markets for health care for all individuals, whether or not they are enrolled in a managed care plan – is an important empirical question. However, no previous work has investigated this

issue.

In this paper, we analyze updated populations of elderly Medicare beneficiaries from 1984-1994, matched with information on tort laws and managed care enrollment rates from the state in which the patient was treated, to study how managed care and liability reform interact to affect medical treatment decisions, health care costs, and health outcomes – and ultimately social welfare. We present two findings. First, in both high and low managed care environments, reforms that directly reduce liability pressure -- such as caps on damages -- lead to long-run reductions in hospital expenditures but no important effects on patient health outcomes. Thus, direct reforms reduce defensive practices both in areas with low and with high levels of managed care enrollment.

Second, managed care and direct reforms do not have long-run interaction effects that are harmful to patient health. However, especially for patients with IHD, the magnitudes of the estimated average effects of direct liability reforms are somewhat smaller than in previous work based on earlier time periods, because managed care and most types of liability reform are substitutes. This is likely due to the fact that patients with IHD are more likely to have marginal indications for intensive treatment; the more parsimonious practices associated with managed care are more likely to reduce physicians' incentives and ability to engage in defensive treatments for IHD, and therefore to reduce the magnitude of the effects of liability reform. Among patients with both AMI and IHD, hospital expenditures can be reduced by up to approximately 7 percent through both direct reforms and high levels of managed care enrollment.

Our results also have implications for the current debate over the appropriateness of extending malpractice liability to MCOs. Currently, the federal U.S. Employee Retirement

Income Security Act (ERISA) preempts certain state law malpractice claims against MCOs that administer plans that pay directly out of employers' assets, on the grounds that the MCOs are acting as "administrators of an employee benefit plan" (see Frankel 1994 and Bearden and Maedgen 1995 for an extensive legal analysis of the ERISA preemption question). Some observers have suggested that ERISA preemption should be repealed, thereby holding MCOs liable for coverage decisions in particular cases, because of concerns that managed care is more likely to result in inadequate precautionary care decisions. Along these lines, several states have passed recent legislation that seeks to expand liability for MCOs within the constraints of ERISA.

Since there is no evidence that the level of liability in states both with reforms and with substantial influence of managed care (as measured by enrollment rates) is too low, our results provide little evidence to support the repeal of ERISA preemption, on the grounds that the *overall* level of liability on doctors and MCOs together is insufficient. For example, one possible way to repeal ERISA preemption would be to allow malpractice plantiffs two separate legal causes of action, one against their physician, and one against their MCO. To the extent that any determination of liability at trial involves a stochastic component, this mechanism could increase the overall level of liability by giving plaintiffs the option of taking "two bites at the apple." The expected value of a stochastic tort claim rises with the number of draws allowed to the claimholder, because the value of the claim can only be positive.

However, whether the extension of liability to MCOs would improve welfare *if the overall level of liability and thus malpractice pressure were held constant* remains an open question. To the extent that MCOs have medical decision-making authority in practice, it may be

efficiency-enhancing to reallocate tort liability from physicians to MCOs, if this cannot be accomplished through contracts between physicians and MCOs. This potentially could be accomplished by the mechanism set out in detail in Frankel (1994): a bifurcated malpractice trial that first evaluated whether *some* party had behaved negligently and caused injury, and second apportioned responsibility between physicians and MCOs.

However, continuing changes in health care delivery and financing arrangements may reduce the salience of the issue of ERISA preemption in the future. For example, capitated contracts for managing all patient care, in which multispecialty physician practices bear the risk for health care expenses of covered patients, have become common between physician groups and health plans in many markets. These contracts presumably reflect the preeminence of the treating physicians in making ultimate patient care decisions, and have occurred despite the fact that physician groups historically have not borne insurance risks. A logical next step is direct contracting between employers and physicians, with MCOs increasingly providing plan administration services to physician groups. Since the treating physicians would more clearly be ultimately responsible for care decisions in these cases, it is difficult to see how an MCO could be held legally responsible for medical management advice even in the absence of ERISA.

Although we reach some important conclusions about the role of malpractice liability in an era of managed care, substantial work remains to be done. We examine only the spillover effects of managed care. While it is possible that the effects of liability laws may be greater for patients who are enrolled in managed care plans, it seems unlikely that physician practices could diverge too much between MCO and non-MCO patients (e.g., Cutler, McClellan, and Newhouse, 1999). It is also possible that effects might be different for other patient groups, e.g., Medicaid

and uninsured individuals, who might be subject to additional "spillover" reductions in treatment intensity from the emergence of managed care. Finally, we do not identify the mechanisms through which the changes in liability pressure and managed care penetration achieve their effects on area practice patterns. Such research could both validate the findings in this paper and provide an empirical foundation for simulating how managed care, liability reform, and other untried approaches to improving productivity in health care might interact.

**Table 1: Legal Reforms Used In Analysis**

| Reform | Description of Reform | Potential Impact on Liability |
|---|---|---|
| Caps on damage awards | Either noneconomic (pain and suffering) or total damages payable are capped at a statutorily-specified dollar amount | Direct |
| Abolition of punitive damages | Medical malpractice defendants are not liable for punitive damages under any circumstances | Direct |
| No mandatory prejudgment interest | Interest on either noneconomic or total damages accruing from either the date of the injury or the date of filing of the lawsuit is not mandatory | Direct |
| Collateral-source rule reform | Total damages payable in a malpractice tort are statutorily reduced by all or part of the dollar value of collateral source payments to the plaintiff | Direct |
| Caps on contingency fees | The proportion of an award that a plaintiff can contractually agree to pay a contingency-fee attorney is capped at a statutorily-specified level | Indirect |
| Mandatory periodic payments | Part or all of damages must be disbursed in the form of an annuity that pays out over time | Indirect |
| Joint-and-several liability reform | Joint and several liability is abolished for noneconomic or total damages, either for all claims or for claims in which defendants did not act in concert | Indirect |
| Patient compensation fund | Doctors receive government-administered excess malpractice liability insurance, generally financed through a tax on malpractice insurance premiums | Indirect |

Source: Kessler and McClellan 1996, 1997, 1998.

**Table 2: Average Expenditures, Outcomes, and Demographic Characteristics For AMI and IHD Populations Used In Analysis, Selected Years, 1984-1994**

**AMI Population**

| | 1984 | 1987 | 1990 | 1994 |
|---|---|---|---|---|
| **1-year total hospital expenditures** | $12,076.49 | $13,945.44 | $15,216.34 | $18,079.03 |
| **1-year mortality** | 40.2 | 40.2 | 36.5 | 32.8 |
| **1-year AMI readmit** | 6.2 | 5.6 | 5.3 | 5.3 |
| **1-year CHF readmit** | 7.8 | 8.1 | 8.5 | 8.4 |
| **Mean age (Standard deviation)** | 75.5 (7.1) | 76.0 (7.3) | 76.3 (7.3) | 76.4 (7.4) |
| **Female** | 48.2 | 49.8 | 49.9 | 48.7 |
| **Black** | 5.2 | 5.4 | 5.5 | 5.8 |
| **Rural** | 28.7 | 30.0 | 29.8 | 30.8 |
| **Sample size** | 245,378 | 219,855 | 209,957 | 230,613 |

**IHD Population**

| | 1984 | 1987 | 1990 | 1994 |
|---|---|---|---|---|
| **1-year total hospital expenditures** | $11,682.31 | $12,775.67 | $14,302.17 | $16,921.47 |
| **1-year mortality** | 13.5 | 11.6 | 10.2 | 9.5 |
| **1-year AMI readmit** | 3.7 | 3.0 | 2.7 | 2.6 |
| **1-year CHF readmit** | 6.2 | 5.4 | 5.5 | 5.6 |
| **Mean age (Standard deviation)** | 74.5 (6.9) | 74.3 (6.8) | 74.4 (6.8) | 74.5 (6.7) |
| **Female** | 55.5 | 54.1 | 51.9 | 49.1 |
| **Black** | 5.9 | 5.7 | 5.8 | 6.0 |
| **Rural** | 30.2 | 30.4 | 29.6 | 30.1 |
| **Sample size** | 359,166 | 345,755 | 355,118 | 355,063 |

Note: Hospital expenditures in 1993 dollars. Outcome measures and demographic characteristics except age in percentage points. Readmission rates based on 30-day exclusion rule (see text).

## Table 3: Chronology of Legal Reforms Through 1994*

| State | Year Effective Direct Reform | Indirect Reform | State | Year Effective Direct Reform | Indirect Reform |
|---|---|---|---|---|---|
| Alabama | 1987 | 1987 | Montana | 1987 | |
| Alaska | 1976, 1986 | 1989 | Nebraska | 1960, 1976 | 1976 |
| Arizona | | 1988 | Nevada | | |
| Arkansas | | | New Hampshire | 1986 | |
| California | 1975 | 1975, 1986 | New Jersey | 1987 | 1972, 1976 |
| Colorado | 1986 | 1986, 1988 | New Mexico | 1976 | 1976, 1987 |
| Connecticut | 1985 | 1986 | New York | 1967, 1984 | 1970, 1985 |
| Delaware | | 1976 | North Carolina | | |
| Florida | 1976, 1986 | 1980, 1985, 1986 | North Dakota | | 1987 |
| Georgia | | | Ohio | 1975 | 1988+++ |
| Hawaii | 1986 | | Oklahoma | | 1953, 1978 |
| Idaho | 1987, 1990 | 1987 | Oregon | 1975, 1987 | 1975+, 1987 |
| Illinois | 1976, 1985 | 1985 | Pennsylvania | | 1975 |
| Indiana | 1975 | 1975, 1985 | Rhode Island | 1976 | |
| Iowa | 1975 | | South Carolina | | 1976 |
| Kansas | 1986, 1988 | 1974, 1976 | South Dakota | 1976 | 1988 |
| Kentucky | | | Tennessee | 1975 | 1975 |
| Louisiana | 1975, ** | 1975, 1984 | Texas | 1977, 1992 | |
| Maine | 1989 | 1985 | Utah | 1985, 1986 | 1985, 1986 |
| Maryland | 1986 | | Vermont | | 1970 |
| Massachusetts | 1986, ** | 1986 | Virginia | 1974 | |
| Michigan | 1986 | 1981 | Washington | ** | 1986 |
| Minnesota | 1986 | | West Virginia | 1986 | |
| Mississippi | | | Wisconsin | 1986++ | 1975, 1986 |
| Missouri | 1986 | 1986 | Wyoming | | 1986, 1987 |

Notes: * - Except prejudgment interest. Montana imposed prejudgment interest in 1985. No other states repealed or imposed prejudgment interest 1985-1993. The following states imposed mandatory prejudgement interest effective before 1984: AK, CO, IA, LA, ME, MA, NH, NJ, NC, OK, RI, UT, WV.
** - Common law effective before 1984 prohibits punitive damages. + - repealed 1987. ++ - held unconstitutional or expired, 1991. +++ - held unconstitutional, 1993.

Source: Kessler and McClellan (1997), updated through 1994.

## Table 4: States with Managed Care Program Enrollment Above and Below Eleven-Year Pooled Median (1984-1994), Selected Years

| | 1984 | 1987 | 1990 | 1994 |
|---|---|---|---|---|
| **Above Median Enrollment** | AZ, CA, CO, HI, MA, MN, OR, WA, WI | AZ, CA, CO, CT, DE, FL, HI, IA, IL, IN, KS, MA, MD, MI, MN, MO, NC, ND, NH, NJ, NM, NV, NY, OH, OR, PA, RI, UT, WA, WI | AZ, CA, CO, CT, DE, FL, HI, IA, IL, KS, MA, MD, MI, MN, MO, NH, NJ, NM, NV, NY, OH, OR, PA, RI, UT, WA, WI | AZ, CA, CO, CT, DE, FL, HI, IL, IN, KY, MA, MD, MI, MN, MO, NE, NH, NJ, NM, NV, NY, OH, OR, PA, RI, TN, TX, UT, VT, WA, WI |
| **Below Median Enrollment** | AK, AL, AR, CT, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MD, ME, MI, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, UT, VA, VT, WV, WY | AK, AL, AR, GA, ID, KY, LA, ME, MS, MT, NE, OK, SC, SD, TN, TX, VA, VT, WV, WY | AK, AL, AR, GA, ID, IN, KY, LA, ME, MS, MT, NC, ND, NE, OK, SC, SD, TN, TX, VA, VT, WV, WY | AK, AL, AR, GA, IA, ID, KS, LA, ME, MS, MT, NC, ND, OK, SC, SD, VA, WV, WY |

Note: Median enrollment rate for 11-year period is 7.13%.

## Table 5: Effect of State Tort Reforms and Managed Care Enrollment Rates on on Expenditures and Health Outcomes for Elderly Heart Attack and Ischemic Heart Disease Patients, 1984-94

| | Heart Attack (N = 2,466,801) | | | | IHD (N = 3,823,990) | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | ln(Total Hospital Expenditures) | 1-Year Mortality | 1-Year AMI Readmit | 1-Year HF Readmit | ln(Total Hospital Expenditures) | 1-Year Mortality | 1-Year AMI Readmit | 1-Year HF Readmit |
| Difference-in-Difference Effects of Reforms | | | | | | | | |
| Direct reform, soon after adoption | -0.16 (0.26) | 0.33 (0.16) | -0.12 (0.08) | 0.04 (0.10) | 0.41 (0.27) | 0.03 (0.09) | -0.04 (0.05) | -0.03 (0.07) |
| Direct reform, long after adoption | -4.20 (0.27) | 0.17 (0.16) | -0.11 (0.08) | 0.13 (0.10) | -4.42 (0.27) | -0.09 (0.09) | -0.06 (0.05) | -0.08 (0.07) |
| Indirect reform, soon after adoption | -3.63 (0.27) | 0.16 (0.17) | -0.10 (0.08) | -0.15 (0.10) | -1.85 (0.27) | 0.23 (0.09) | -0.01 (0.05) | 0.17 (0.07) |
| Indirect reform, long after adoption | 0.20 (0.28) | 0.16 (0.17) | -0.03 (0.09) | -0.34 (0.10) | 1.06 (0.29) | -0.01 (0.09) | -0.03 (0.05) | 0.05 (0.07) |
| Effect of Managed Care Enrollment (omitted category = less-than-median enrollment/population) | | | | | | | | |
| High managed care enrollment | -2.99 (0.21) | 0.10 (0.13) | 0.03 (0.06) | 0.06 (0.08) | -4.40 (0.21) | -0.03 (0.07) | -0.13 (0.04) | 0.06 (0.05) |

Notes: standard errors in parentheses. Hospital Expenditures in 1993 dollars. Coefficients from expenditures and costs models *100 from regressions in logarithms; Coefficients from outcome models in percentage points.

**Table 6: Effect of State Tort Reforms and Managed Care Enrollment Rates on on Expenditures and Health Outcomes for Elderly Heart Attack and Ischemic Heart Disease Patients, 1984-94 Allowing for Interactions between Reforms and Managed Care, and the Effect of Managed Care to Vary Over the Study Period**

| | Heart Attack (N = 2,466,801) | | | | IHD (N = 3,823,990) | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | ln(Total Hospital Expenditures) | 1-Year Mortality | 1-Year AMI Readmit | 1-Year HF Readmit | ln(Total Hospital Expenditures) | 1-Year Mortality | 1-Year AMI Readmit | 1-Year HF Readmit |
| Difference-in-Difference Effects of Reforms | | | | | | | | |
| Direct reform, soon after adoption | -1.72 (0.55) | 0.16 (0.34) | -0.14 (0.17) | 0.07 (0.20) | -1.59 (0.56) | 0.31 (0.19) | 0.00 (0.10) | -0.02 (0.14) |
| Direct reform, long after adoption | -3.81 (0.61) | 0.36 (0.38) | 0.51 (0.18) | 0.37 (0.22) | -7.07 (0.61) | -0.10 (0.20) | 0.02 (0.11) | -0.21 (0.15) |
| Indirect reform, soon after adoption | 0.52 (0.55) | 0.46 (0.34) | 0.00 (0.17) | -0.40 (0.20) | 2.37 (0.56) | 0.20 (0.18) | 0.06 (0.10) | 0.18 (0.14) |
| Indirect reform, long after adoption | -2.25 (0.58) | 0.31 (0.36) | -0.31 (0.18) | -0.33 (0.21) | 1.64 (0.59) | 0.11 (0.19) | -0.03 (0.11) | 0.15 (0.14) |
| Reform*Managed Care Enrollment Interactions | | | | | | | | |
| High man care*direct soon after adoption | 1.01 (0.62) | 0.32 (0.38) | 0.04 (0.19) | -0.05 (0.22) | 1.34 (0.63) | -0.39 (0.21) | -0.05 (0.11) | -0.04 (0.15) |
| High man care*direct long after adoption | 0.67 (0.65) | 0.02 (0.41) | -0.70 (0.20) | -0.28 (0.24) | 4.14 (0.65) | -0.01 (0.21) | -0.10 (0.12) | 0.16 (0.16) |
| High man care*indirect soon after adoption | -8.21 (0.59) | -0.57 (0.36) | -0.10 (0.18) | 0.33 (0.21) | -9.01 (0.60) | 0.13 (0.20) | -0.03 (0.11) | -0.04 (0.15) |
| High man care*indirect long after adoption | -0.61 (0.61) | -0.33 (0.38) | 0.37 (0.18) | -0.05 (0.22) | -4.75 (0.61) | -0.04 (0.20) | 0.08 (0.11) | -0.12 (0.15) |

Notes: standard errors in parentheses. Hospital Expenditures in 1993 dollars. Coefficients from expenditures and costs models *100 from regressions in logarithms; Coefficients from outcome models in percentage points. Models allow time fixed effects to vary in areas with high versus low managed care enrollment rates.

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