Defensive Medicine:

The Effects of Medical Malpractice Tort Law on Physician Behavior

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Abstract

Since the 1970s, defensive medical practices have been cited as a possible result of medical malpractice law. With healthcare costs on the rise, it is important to analyze whether defensive medical practices exist, as they may cause both indirect and direct rises in medical expenditure. This paper estimates the effect of medical malpractice pressure on the number of Magnetic Resonance Imaging (MRI) tests performed in public hospitals across 25 different states in 2002. Although the total expenditure by medical malpractice insurance companies does not significantly affect the number of MRIs performed, the existence of a damage awards cap reduces the number of MRIs performed by approximately 374.

I. Introduction

According to a recent study, American health care costs reached over 1 billion dollars annually in 2004, $236 billion of which is paid out of pocket. Total healthcare expenditure is projected to reach over 4 billion by 2015 (United States Census Bureau, 2007). With this exponential growth, much recent research has been devoted to finding the sources causing healthcare to become so expensive. Among many other factors, including advancing technology, researchers are pointing to the appearance of defensive medical practices.

Since the 1970s, lawyers, economists, and physicians have questioned the effectiveness and efficiency of the medical malpractice system. Although the system is, in theory, designed to protect patients from harm caused by negligent doctors and to encourage doctors to be more comprehensive and careful in their care, many claim that the system is doing little to further these causes, and is perhaps even causing more harm than benefit. These researchers point to the appearance of “defensive medicine”, which can be simply defined as administering precautionary treatments or tests with minimal expected benefit and avoiding riskier but possibly more beneficial treatments for fear of liability or litigation.

II. A Brief History of Research in Defensive Medicine

The research and investigation of the 70s is summarized by Laurence Tancredi and Jeremiah Barondess (1978). They propose that the increasing number and magnitude of medical malpractice claims leads doctors to practice defensive medicine. They discuss two possible outcomes of medical malpractice pressure, classifying positive defensive medicine as the implementation of additional tests and procedures to avoid medical malpractice suits, and negative defensive medicine as the avoidance of beneficial but more risky procedures.

The research compiled by Tancredi and Barondess investigates the existence and magnitude of defensive medicine as well as its effects on patient health outcomes and healthcare costs. One arm of the research in the 1970s was the study of certain diagnostic tests, most frequently x-rays, and the ratio of diagnoses to number of tests administered. These studies find that tests were prescribed frequently with limited benefit, and attribute this discrepancy to doctors attempting to avoid medical malpractice suits. However, the studies provide no empirical evidence that excessive testing was due to medical malpractice pressure. Those who did attempt to directly demonstrate the existence of defensive medicine, such as the Duke Law Journal in 1971 and the American Medical Association Center for Health Services, Research in Development in 1977, did so through questionnaires and opinion surveys, providing only hypothetical results. Additionally, the Duke Law Journal study found that defensive medicine was typically not present and was not directly affected by the level of medical malpractice pressure (Tancredi and Barondess, 1978).

Tancredi and Barondess point out some of the gaps and problems with the research being done at that time. They state that x-rays and other procedural studies have been inconclusive, because they fail to draw a connection between medical malpractice pressure and excessive testing. Studies based directly on physician behavior are also problematic because they rely heavily on surveys and opinions, causing results to be dependent upon individual physician's perceptions of healthcare quality standards and assumptions about how they would behave in hypothetical situations.

Research in the 1980s and early 1990s in the field of defensive medicine generally falls into three branches: physician surveys, estimation of the effects of medical malpractice reforms on the number and magnitude of malpractice claims, and studies of the effects of medical malpractice pressure on physician behavior. The first branch conducts research through scenario surveys (Klingman, et al., 1996). These surveys find that doctors believe that they are practicing defensive medicine, but like the research of the 1970s, provide hypothetical results rather than an analysis of actual physician behavior.

The second branch studies how malpractice reforms impact the number and magnitude of malpractice claims. Sloan, Mergenhagen, and Bovbjerg (1989) find that liability caps reduced malpractice awards by 38 to 39 percent, and collateral-source offsets reduced awards by 21 percent. *Danzon (1984) also finds that caps and collateral-source offsets greatly reduce medical malpractice pressure. This research provides evidence of the effect of malpractice reforms on physician incentives, but* *does not directly relate these reforms to actual physician behavior (Kessler and McClellan, 1996).*

The third branch of research attempts to bridge this gap. Rock (1988) finds that insurance premiums have a positive correlation with Cesarean Section rates based on data from New York and Illinois. This shows that increased medical liability pressure, measured by the insurance premium level proxy, causes doctors to increase defensive procedures, measured by the Cesarean Section rate proxy. A similar study based on data from New York in 1984 also found a positive correlation between malpractice premiums and Cesarean Section rate (Localio, et al., 1993). However, as Kessler and McClellan (1996) discuss, these results are limited because they study only one or two states over a period of less than one year. This means that malpractice pressure is relatively constant, and therefore variations could be due to other factors, such as a particular physician's quality of care perception, the demand that patients have for Cesarean Sections, or the level of health of the patients.

Daniel Kessler and Mark McClellan (1996) study Medicare beneficiaries being treated for serious heart disease. Their research seeks to establish direct evidence of the existence and magnitude of defensive medicine by examining the link between medical malpractice tort law, treatment intensity, and patient outcomes. Using a panel data framework to compare time trends across reforming and non-reforming states for 7 years, they find that reducing medical liability pressure reduced defensive medical practices and lowered medical expenditures by 5-9% without significant change in mortality rates or medical complications. This is a crucial new step for research in defensive medicine, because they are the first to establish empirical results showing how medical malpractice reforms affect physician behavior, medical costs, and health outcomes. However, the results are limited by the fact that the data comes only from Medicare recipients with heart problems. This creates an age bias and a specialty bias, and therefore does not prove the existence or demonstrate the magnitude of defensive medicine in other age groups or medical fields.

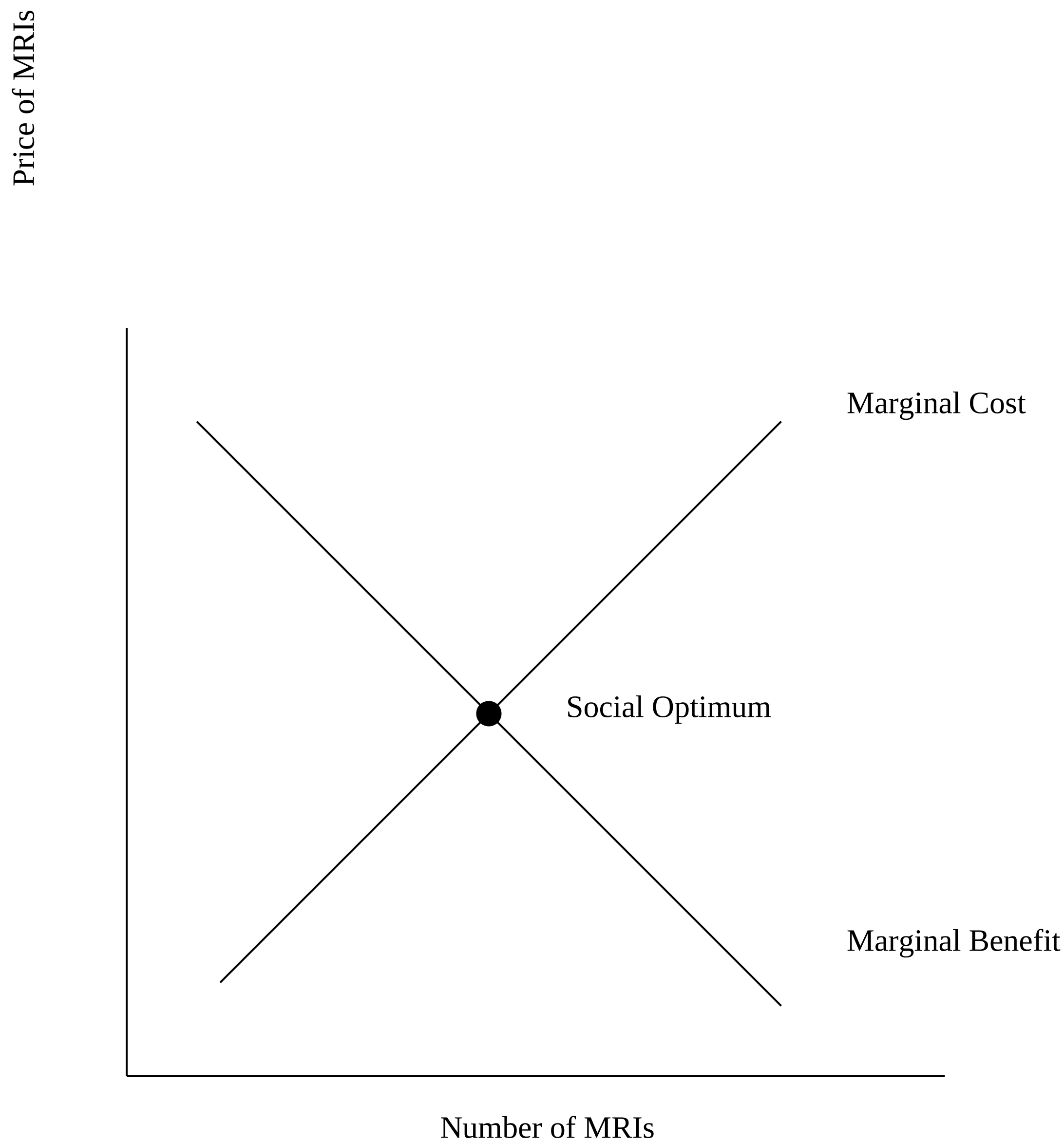
Research since 1996 has moved away from studies demonstrating that defensive medicine exists and towards studies showing how it affects healthcare costs, insurance risk premiums, and the likelihood of physicians to report mistakes. Robert Quinn (1998) establishes an economic model showing defensive medicine as a loss-preventative good to lower the probability of a malpractice claim. Thomas May and Mark Aulisio (2001) begin investigating the pressure that medical malpractice pressure creates for the prevention of repeated future medical mistakes.

Despite all of this varied and interesting research, medical malpractice laws and defensive medical practices continue to be a contentious problem in today's society. With further studies proving the existence and behavioral effects of defensive medicine, we may be able to identify the specific problem and the best way to approach it to improve medical care and decrease medical spending. In this paper, I seek to further establish the existence of defensive medicine by expanding it beyond Medicare recipients to capture the general population. I also seek to further the current body of research by estimating the effects of medical malpractice pressure on the number of Magnetic Resonance Imaging (MRI) tests prescribed, widening the spread of medical specialties included in defensive medical practice studies.

II. The Impact of Medical Malpractice Law on Behavior of Doctors: A Model

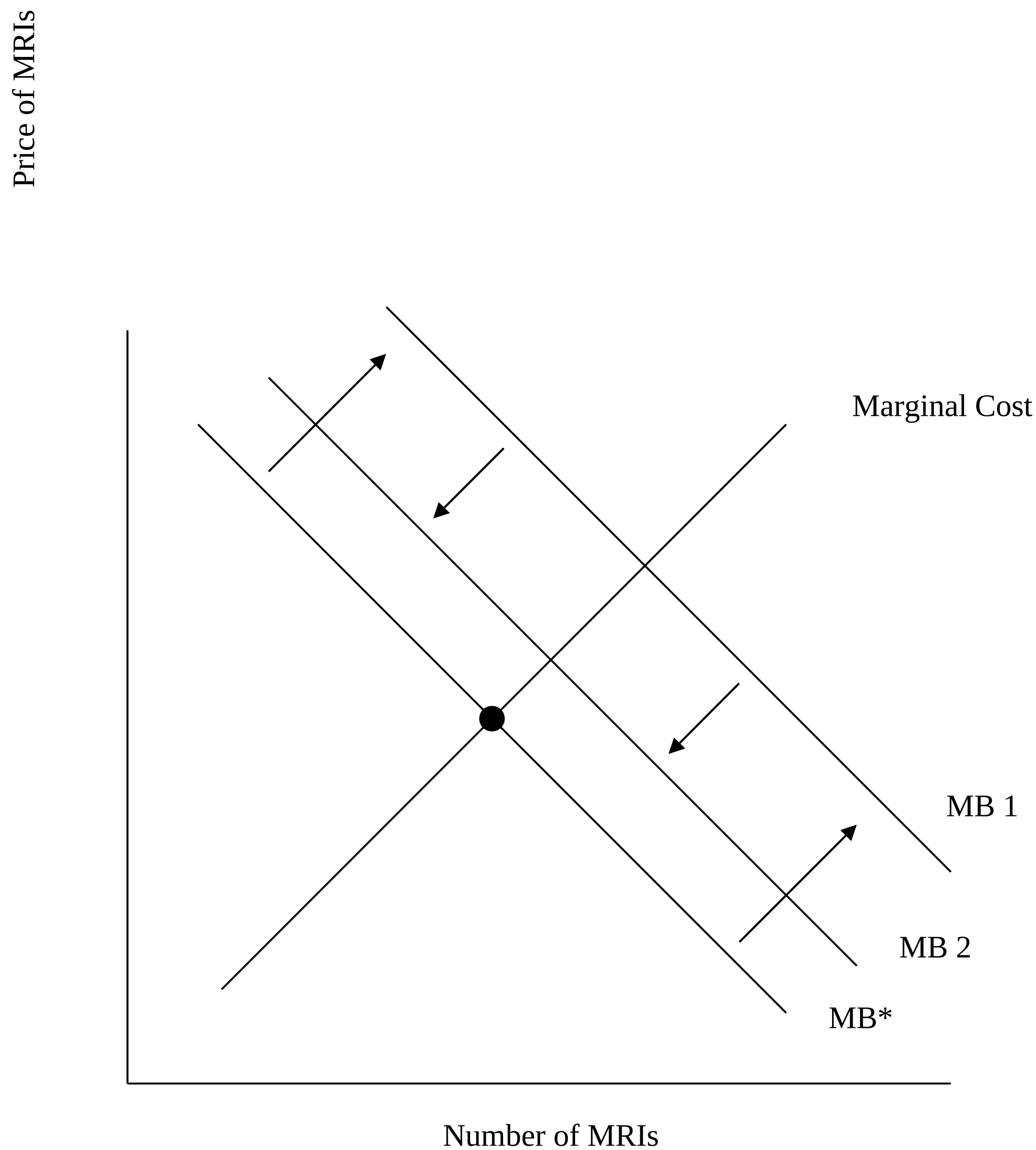
In this study, I hope to expand upon the work done by McClellan and Kessler in 1996 to show that strict medical malpractice laws cause doctors to over-utilize tests, specifically MRI tests. My study is based on the assumption that doctors want to maximize patient health outcomes at the lowest possible cost, and that this health outcome is a function of the number of tests prescribed.

At the most basic level, the issue of defensive medicine and its effects on doctor behavior is a marginal cost and marginal benefit relationship, plotting the number of tests prescribed on the x-axis and the price of tests on the y-axis. The marginal cost to doctors of ordering a test is the price of the MRI. The marginal benefit of ordering a test is the decreased likelihood of a medical malpractice suit. In the marginal cost/benefit graph, where the marginal cost and marginal benefit curves intersect is the optimal social result.



In the above graph, the upward sloping marginal cost curve intersects with the downward sloping marginal benefit curve at the social optimum. At this point, there is no incentive for doctors to prescribe more or less tests.

I compare the marginal cost curve of a hostile medical malpractice environment to the marginal cost curve of a less hostile medical malpractice environment, and expect to see that the less hostile environment will intersect the marginal benefit curve at a point closer to the social optimum than the hostile environment.



In the above graph, MB1 represents the marginal benefit curve with high medical malpractice pressure, and MB 2 represents the marginal curve with lower medical malpractice pressure. The intersection of MB 2 with marginal cost is closer to the social optimum represented by the intersection of MB* and marginal cost than the intersection of MB2 with marginal cost. This demonstrates that medical malpractice pressure reduction reforms bring society closer to the optimum level of MRI tests performed.

IV. Empirical Results

a. Econometric Model

The econometric model for this study will use Ordinary Least Squares to estimate the effect of medical malpractice pressure in several states on the x-axis against the number of MRI tests prescribed on the y-axis. The hostility of the medical malpractice environment will be measured both by the expense of medical malpractice suits for all major insurance companies, *MALCOST*, as well as by a dummy variable, *CAPDUMMY*, comparing states with a cap on malpractice suits to those without a cap. Median income, *MEDINCOME*, will be included as a control.

$$\boldsymbol{Y}_i = \boldsymbol{\beta}_{1i} + \boldsymbol{\beta}_{2i}(MALCOST) + \boldsymbol{\beta}_{3i}(MEDINCOME) + \boldsymbol{\beta}_{4i}(CAPDUMMY) + \boldsymbol{\varepsilon}_i$$

I expect to find a positive correlation for *MALCOST*, showing that as the magnitude of malpractice claims increases, the heightened medical malpractice pressure causes doctors to perform more MRIs. I expect to find a negative correlation for *CAPDUMMY*, demonstrating that the absence of a cap on medical malpractice awards creates a higher level of malpractice pressure and causes doctors to perform more MRIs. Finally, I expect to find a positive correlation for *MEDINCOME*, the income control variable, because wealthier patients are more likely to be able to afford MRIs.

b. Data

I used two sets of data as a proxy for medical malpractice pressure. The expense of medical malpractice suits to insurance companies is from the National Association of Insurance Commissioners (2004). The Association collected data for all insurance companies with a market share of more than 2.0 percent. This data is an indicator of the magnitude of the threat of medical malpractice litigation to doctors, but leaves out statistics for smaller insurance companies and may be skewed by one or two unusually large suits.

The second measure of hostility was collected from the National Conference of State Legislatures (2005). The NCSL showed the Limits on Damage Awards across different states. This data demonstrates the severity of medical malpractice laws and therefore the pressure of the medical malpractice environment, but is limited because the data is from a year later than the rest of the data used in this study. It is also limited when used as a dummy variable because it simply states whether or not a cap exists, not taking into account that caps may be very low, causing very little threat to doctors, or extremely high, causing a threat to doctors almost as large as in states with no cap at all.

My measure of defensive behavior of doctors is the number of MRIs performed in different states. Using the Health Cost and Utilization Project (United States Department of Health and Human Services, 2005) I was able to create a table showing the number of MRIs for all discharges from community hospitals across 25 states. However, this data is not ideal because it excludes MRIs performed in military hospitals and in private facilities.

Finally, my model controls for income level across the states because it may affect the marginal benefit and marginal cost of ordering MRIs. This data was collected from the Current Population Survey (United States Census Bureau, 2003, 2004, and 2005) in a study showing the median household income in each state between 2002 and 2004.

c. Results of Statistical Data

Dependent Variable is Number of MRIs	
	Coefficient

MALCOST	.0000119
MEDINCOME	.0556754
CAPDUMMY	-373.9807
CONSTANT	-1703.717
N	25
R-Squared	.5231

The results of the statistical data are consistent with my hypothesis. First, it shows a positive correlation between *MALCOST* and the number of MRIs performed. For each dollar increase in *MALCOST*, the number of MRIs performed increases by .0000119, or for every $10,000 increase in *MALCOST*, one more MRI will be performed. However, the correlation is weak, which may be due to the imperfections in the data or the outlier data for South Carolina.

Second, the analysis shows the expected negative correlation between the cap dummy and the number of MRIs performed. This correlation shows that, when a cap exists, the number of MRIs decreases by approximately 374, a very strong correlation.

Finally, the R-squared value of 0.5231 shows that more than fifty percent of the variance in the number of MRIs performed can be explained by the three factors utilized in the equation. Further research could improve upon the model by including more than 25 states, finding data to include private practice MRIs performed and

MRIs performed in military hospitals, and by investigating the situation in South Carolina to determine the reason for its inconsistent data.

V. Sources Cited

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Appendix

Table 1: Total number of MRIs performed in public hospitals for all discharges in 2002 across 25 states. It should be noted that, for New Hampshire, data for MRIs in 2002 was unavailable, so data for 2003 was used instead.

	MRIs in 2002
Arizona	216
California	13,045
Colorado	150
Florida	2,989
Hawaii	871
Iowa	570
Kentucky	316
Maine	236
Massachusetts	1,815
Michigan	3,939
Minnesota	1,414
Missouri	1,810
Nebraska	35
Nevada	358
New Hampshire (2003)	144
New Jersey	7,073

New York	11,738
North Carolina	1,279
Oregon	286
Rhode Island	287
South Carolina	7,023
Vermont	218
Washington	805
West Virginia	541
Wisconsin	1,276

Source: United States Department of Health and Human Services (2005). *Healthcare Cost and Utilization Project*. Retrieved October, 2007.

Table 2: Total Expense of Medical Malpractice Suits for All Major (those with market share > 2.0 percent) Insurance Companies in 2002 across 25 states. Malpractice costs for New Hampshire are for 2003, in order to maintain consistency with the MRI data collected. It should also be noted that South Carolina appears to be an outlier, which may affect the results of the study.

	Expense in 2002 ($)
Arizona	97,767,250
California	326,527,222
Colorado	50,738,396
Florida	490,792,352
Hawaii	15,292,360
Iowa	32,041,557
Kentucky	67,387,923
Maine	25,656,414
Massachusetts	203,850,530
Michigan	83,804,814
Minnesota	30,018,203
Missouri	148,608,347
Nebraska	18,064,819
Nevada	98,897,593
New Hampshire (2003)	11,568,856

New Jersey	305,928,219
New York	1,014,523,451
North Carolina	100,020,677
Oregon	49,691,883
Rhode Island	25,363,865
South Carolina	19,794,163
Vermont	7,106,841
Washington	136,573,681
West Virginia	79,544,101
Wisconsin	29,080,061

Source: National Association of Insurance Commissioners (2004). Medical Malpractice Insurance Report: A Study of Market Conditions and Potential Solutions to the Recent Crisis. Retrieved October, 2007.

Table 3: Median income in 2002-2004 across 25 states.

	Median Income ($)
Arizona	42,590
California	49,894
Colorado	51,022
Florida	40,171
Hawaii	53,123
Iowa	43,042
Kentucky	37,396
Maine	39,395
Massachusetts	52,354
Michigan	44,476
Minnesota	55,914
Missouri	43,988
Nebraska	44,623
Nevada	46,984
New Hampshire	57,352
New Jersey	56,772
New York	44,228
North Carolina	39,000
Oregon	42,617
Rhode Island	46,199
South Carolina	39,326
Vermont	45,692
Washington	48,688
West Virginia	32,589
Wisconsin	47,220

Source: United States Census Bureau (2003, 2004, 2005). *Current Population Survey*. Retrieved October, 2007.

Table 4: Damage caps for non-economic damages in 2002 across 25 states.

	Damage Cap in 2002 ($)
Arizona	none
California	250,000
Colorado	1,000,000
Florida	none
Hawaii	375,000
Iowa	none
Kentucky	none
Maine	none
Massachusetts	500,000
Michigan	500,000
Minnesota	none
Missouri	557,000
Nebraska	200,000
Nevada	350,000
New Hampshire	875,000
New Jersey	250,000-500,000
New York	none
North Carolina	none
Oregon	500,000
Rhode Island	none
South Carolina	none
Vermont	none
Washington	capped
West Virginia	1,000,000
Wisconsin	350,000

Source: National Conference of State Legislatures (2005). State Medical Malpractice Tort Laws. Retrieved October, 2007.