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Strict Liability for Medical Injuries?
The Impact of Increasing Malpractice Liability on Obstetrician Behavior: Evidence from Taiwan

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Strict Liability for Medical Injuries?

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*** Preliminary and Incomplete – Please Do Not Cite – Comments Welcome ***

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Abstract
Policy makers and academics have long debated the existence and extent of defensive medicine in the face of medical malpractice liability pressure. In this paper, I investigate how physicians' test-ordering behavior and propensity to perform cesarean sections were affected first by a series of court rulings in Taiwan that increased physicians' liability risks, and then by a subsequent amendment to the law that reversed the courts' rulings. I find that physicians faced with higher malpractice pressure increased laboratory tests as expected but unexpectedly reduced cesarean sections. The reduction in cesarean deliveries may be due to the fact that liability risks were more closely aligned with physicians' standard of care after the court rulings. After the law was amended to negate the court decisions, physicians reversed their previous behavior, reducing laboratory tests and increasing cesarean deliveries. This pattern of behavior strongly suggests that physicians in Taiwan practice defensive medicine.

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1 Introduction

Can increasing physician liability for patient injuries encourage safer medical practices? According to traditional tort law, of which medical malpractice is a part, plaintiffs generally must prove that their physicians deviated from the standard of care accepted in the medical profession, and that the deviation is the actual or proximate cause of their injury, to prevail in a civil suit for damages. Detractors of the tort system lament its arbitrariness, its inability to provide adequate compensation for victims of medical error, and its potential to raise costs by promoting the practice of "defensive medicine" – defined as the ordering of tests and procedures that contribute little to patient health to reduce medico-legal risk. Proponents of the tort system, however, worry that medical errors and iatrogenic injuries will increase if physicians are not held accountable for their negligent acts. Yet despite considerable empirical research, there is little evidence that malpractice litigation deters medical negligence. On the other hand, the evidence is much stronger, although still hotly debated, that malpractice fears encourage physicians to engage in defensive medicine. This paper joins the discussion by providing further support that greater malpractice liability may, under certain circumstances, prompt physicians to perform more services without necessarily improving patient health.

Malpractice liability, along with medical technology and payment system distortions, perennially figures among the most cited reasons for escalating health-care spending. Harvard economist Amitabh Chandra estimates that direct litigation and indirect defensive medicine cost more than $60 billion annually, or 3% of total health-care spending in the United States (David Leonhardt, 2009). Tort reform advocates place the figure at $200 billion by extrapolating to the entire U.S. population the results of a study that shows a 5% to 9% reduction in costs for

Medicare heart patients following tort reforms that lower provider liability (D Kessler and M McClellan, 1996). Given that medical spending growth outpaces inflation by 2.8% to 6.1% (Mike Mitka, 2009), any reform that minimizes unnecessary costs in the health-care sector should be seriously considered.

Yet existing research has failed to reach a consensus on the prevalence, the extent, or even the existence of defensive medicine. Survey studies that rely solely on physician self-reports of defensive medicine are prone to self-interested reporting bias (D Klingman et al., 1996, DM Studdert et al., 2005). Cross-sectional associations of malpractice premium levels and measures of treatment intensities may be plagued by the problem of reverse causality (LM Baldwin et al., 1995, AR Localio et al., 1992, FA Sloan et al., 1997, A. Dale Tussing and Martha A. Wojtowycz, 1997). Even well-designed empirical studies based on longitudinal data and exogenous policy changes, such as statewide tort reforms, have had the external validity of their conclusions challenged (J Currie and WB MacLeod, 2008, D Kessler and M McClellan, 1996, DP Kessler and MB McClellan, 2002). This paper addresses the reporting and endogeneity biases of the survey and cross-sectional studies and extends the conclusions of the longitudinal studies with policy changes by showing that payment incentives and the organizational and ownership structure of medical providers may interact with the effects of legal changes. In particular, in a fee-for-service payment system, I show that increasing physician liability for medical injury encourages more intensive use of laboratory tests, but only marginally reduces profitable cesarean sections for physician-owners of clinics relative to physician-employees. Owners are assumed to bear a much greater liability risk than employees because of Taiwan's legal and institutional context. After the law was amended to decrease physician liability, the number of

laboratory tests ordered decreased and the likelihood of cesarean deliveries increased in some specifications.

I investigate the impact of increasing medical malpractice liability on physicians who provide treatment to pregnant women in both the outpatient and inpatient care settings in Taiwan from 1997 to 2004. In particular, I exploit arguably exogenous legal changes to examine how changes in medical malpractice law affect physicians' test-ordering behavior and likelihood of performing cesarean sections. Traditionally, Taiwanese doctors are held accountable for medical malpractice according to two principal bodies of law: tort law in the Civil Code and, rare among industrialized nations, criminal law for harm resulting from negligent acts in the course of professional operations. In January, 1998, a Taipei District Court decision sent shock waves through the medical community by applying the strict liability doctrine of the Consumer Protection Law to a medical provider in the absence of fault or negligence (Taipei District Court Civil Suit No. 5125, 1996, decision rendered on January 2, 1998).[1] The court decision, whose substance was subsequently affirmed by the Taipei High Court (Appeal Suit No. 151, 1998, decision rendered on September 1, 1999) [2] and the Supreme Court (Taiwan Appeal Suit No. 709, decision rendered on May 10, 2001) [3], elicited resentment among medical professionals. Passions flared in heated debates between medical and legal scholars on whether medical services should be considered a covered "service" under Article 7 of the Consumer Protection Law. Economists and legal academics questioned whether traditional justifications for the imposition of strict liability exist in the highly unpredictable practice of medicine, especially in

[1] 台北地方法院 85 年訴字第 5125 號判決.

[2] 高等法院 87 年上字第 151 號判決.

[3] 最高法院 90 年台上字第 709 號判決.

obstetrics. The saga came to a conclusion in April 2004, when the legislature amended the medical law to require negligence or fault in medical malpractice cases.

Taiwan law follows the Continental – specifically, the Germanic – civil law tradition, which lacks the doctrine of *stare decisis*: even supreme court decisions are not necessarily binding on lower courts. Instead, each judge uses her personal interpretation (*自由心證*, *l'intime conviction* or *freie Beweis Würdigung*) to apply statutory law to the case at hand. There was no *a priori* reason to believe that other courts would choose to follow a district court judge's decision to apply the Consumer Protection Law to medical malpractice cases. Nevertheless, from the perspective of the medical professionals, there was a non-zero probability that the doctrine of strict liability would be invoked in a medical malpractice suit unless legislative action effectively required a showing of negligence or fault for plaintiffs to prevail in a civil suit for damages against their physicians.

I exploit the court rulings and the subsequent legal amendment to examine changes in physicians' test-ordering behavior and likelihood of performing cesarean sections, using a difference-in-differences methodology with physician fixed effects, quarter and regional dummies, patient age, and the presence of pregnancy-related complications. The empirical identification strategy employs two sources of variation in perceived risks of malpractice liability: (1) differences in the level of exposure to malpractice risks due to the organizational form of the physicians' place of practice and (2) differences in perceived risks based on geographical location. In Taiwan, medical malpractice insurance is virtually nonexistent, and physicians generally self-insure against liability. Although each medical provider has its own system of compensating physicians for the financial loss incurred from a liability suit, larger hospitals

generally have pooled funds either at the department or hospital level to help physicians defray malpractice costs. Smaller clinics, and especially physician-owners of clinics, must generally pay any court judgment or settlements out of pocket. As a result, I argue that physician-owners of obstetric clinics are much more exposed to medical malpractice liability than physicians at local and regional hospitals or medical centers. In addition, although the doctrine of *intime conviction* means that any court in Taiwan may decide to follow the Taipei court decision, Taipei clinic owners may perceive a greater malpractice risk than clinic owners located far away from the city.

I find strong empirical evidence that Taiwanese obstetricians practice defensive medicine. First, physicians most exposed to liability risks (i.e., clinic owners) increased laboratory testing when malpractice risks heightened, but reduced testing when malpractice fears abated. Immediately following the Taipei District Court decision, physician-owners of obstetric clinics increased the number of laboratory tests by 0.21 (tests) more than did physicians at medical centers during routine outpatient antepartum examinations. On the other hand, physicians at local and regional hospitals, who are less exposed to liability risks than clinic owners, did not increase laboratory tests more so than physicians at medical centers. In particular, the types of tests that physician clinic owners added – electronic fetal heart monitoring, ultrasounds, and pelvic examinations, rather than tests such as blood chemistry panels or tests to detect sexually transmitted diseases – highly suggest the practice of defensive medicine. Then, after the Medical Law was amended, physician clinic owners reduced the number of diagnostic tests at a higher rate than did physicians at medical centers. Turning now to *inpatient* laboratory expenditures, I find that while Taipei clinic owners did not increase laboratory expenditures more than Kaohsiung clinic owners conditional on having prescribed a laboratory test, Taipei owners did

nevertheless increase the likelihood of ordering one or more laboratory tests by 39% relative to Kaohsiung owners immediately following the district court decision.

Secondly, physicians exposed to higher liability pressure reduced cesarean sections, which are considered riskier than vaginal deliveries for healthy mothers, but increased cesarean deliveries as soon as liability pressures were relieved after the legal amendment. Physician owners as a group reduced the likelihood of profitable cesarean sections relative to physicians at medical centers modestly (−0.8%) after the supreme court decision, but immediately increased cesarean deliveries by 2.3% after the Medical Law amendment. Repeating the analysis of cesarean sections with only the Taipei and Kaohsiung obstetric clinic owners, I show that the likelihood of cesarean deliveries in Taipei dropped by 2.5% relative to Kaohsiung after the district court decision.

Finally, despite these changes in diagnostic tests and cesarean sections, patients of physician-owners generally did not show any improvement or degradation in delivery complication rates. In other words, physician clinic owners appeared to have altered laboratory tests and procedure choice in response to changing liability risks, rather than to changing patient health requirements. Furthermore, I bolster my conclusion that obstetricians in Taiwan practice defensive medicine by showing that they selectively altered behavior traditionally associated with defensive medicine (diagnostic tests and cesarean sections), but did not change other types of treatments for pregnant women. In general, no consistent patterns of growth exist for prescription drug, radiology, and treatment expenditures at the inpatient level when comparing physician-owners and physicians employed at other types of providers. These patterns survive threats to identification when I examine pre-ruling physician behavior across provider classes and geographical locations, demonstrating that the regression estimates are not merely results of

preexisting trends. A falsification test involving generating a fictitious treatment date before the legal rulings also shows no change in the behavior of physician-owners.

In sum, the results support the existence of defensive medicine: First, physician-owners reacted more strongly to the legal changes than non-owners with regard to laboratory tests and cesarean sections, but generally not in other discretionary expenditures not associated with defensive medicine. Second, physician-owners in areas under the jurisdiction of the Taipei District Court reacted more strongly (and in the expected direction) relative to physician-owners located in Kaohsiung, at the opposite end of the island. Here, a special remark should be made with regard to the *negative* association between the likelihood of cesarean deliveries and increased malpractice liability. Although most published studies find that higher malpractice liability risks are associated with higher cesarean rates, Currie and McLeod (2008) propose that reforms that more closely align liability with the tortfeasor's care level may in fact induce the opposite effect. In the Taiwanese context, increased medical malpractice liability accrued directly to the physician-owners. Given that for healthy women in general, cesarean sections are riskier than natural deliveries, it seems logical to expect that higher tort liability in Taiwan may actually decrease the likelihood of deliveries by cesarean section. In this sense, my study confirms the predictions and empirical results of Currie and McLeod (2008).

This paper contributes to our understanding of health law and policy in several concrete ways. First, I add support to the existence of defensive medicine, even in a non–common law jurisdiction. The conclusions are especially robust because of the availability of superior microdata under Taiwan's national health insurance system and the exogeneity of the treatment shocks. Moreover, conducted in an environment that lacks malpractice insurance, and where physicians are owners or employees at providers of varying sizes, my study isolates the pure

effect of malpractice liability to a greater extent than many current studies. Second, my study shows that the interaction of the payment system with the legal system enhances or mitigates the pure effects of legal policies. In a fee-for-service system, physician-owners appear much more willing to order more laboratory tests than they are to reduce profitable cesarean sections. Third, I demonstrate how different organizational forms of health care provision, by exposing physicians to varying degrees of risk, affect physicians' tendency to practice defensive medicine.

The remainder of the article is organized as follows: In Section 2, I provide a brief overview of the current literature on defensive medicine. In Section 3, I examine the legal and institutional context of health care in Taiwan and generate testable hypotheses based on the structure and embedded incentives in the Taiwanese context. I describe the data and empirical methodology in Section 4 and discuss the results in Section 5. In Section 6, I conclude and provide directions for future research.

2 Literature Review

Policy makers' long-standing interest in containing health care costs and in determining the direct and indirect role of medical malpractice in escalating health spending has encouraged a large body of empirical research on defensive medicine. Three types of research dominate this field: (1) studies using survey methods to ask physicians how they react in response to malpractice liability risks (D Klingman, JL Wagner, PT Polishuk, L Wolfe, JA Corrigan, AR Localio and J Sugarman, 1996, K Passmore and WC Leung, 2002, DM Studdert, MM Mello, WM Sage, CM DesRoches, J Peugh, K Zapert and TA Brennan, 2005, N Summerton, 2000); (2) studies that investigate the correlation between measures of malpractice pressure (such as malpractice premiums or frequency/size of malpractice awards) and utilization intensities of

certain tests and procedures, expenditures, and/or health outcomes (K Baicker and A Chandra, 2005, L Dubay et al., 1999, DP Kessler and MB McClellan, 2002, AR Localio, AG Lawthers, TA Brennan, NM Laird, LE HERBERT, LM Peterson, JP Newhouse, PC Weiler and HA HIATT, 1992, FA Sloan, SS Entman, BA Reilly, CA Glass, GB Hickson and HH Zhang, 1997, A. Dale Tussing and Martha A. Wojtowycz, 1997); and (3) studies that exploit exogenous policy changes such as tort reforms on measures of defensive medicine (J Currie and WB MacLeod, 2008, D Kessler and M McClellan, 1996, FA Sloan and JH Shadle, 2009). As a whole, the literature is suggestive of the existence of defensive medicine.

Because this paper falls squarely into the third category of studies, I set aside summaries of research in the first two categories listed above. The landmark empirical study in the cost and existence of defensive medicine is the 1996 article by Kessler and McClellan. Focusing on elderly Medicare patients hospitalized for a first diagnosis of acute myocardial infarction or ischemic heart disease from 1984, 1987, and 1990, Kessler and McClellan (1996) conclude that tort reforms that directly reduce provider malpractice liability decrease hospital expenditures by an average of 5% to 9% without affecting mortality or readmission rates for cardiovascular diseases within one year of the patients' first hospitalization. In this article, Kessler and McClellan distinguish direct reforms (such as reforms that cap awards to plaintiffs) from indirect reforms (such as limiting attorneys' fees) and find that only the former reduced medical expenditures.

Currie and McLeod (2008) examine the impact of tort reforms on birth outcomes and procedure choice and demonstrate that different types of reforms have opposing effects. On the one hand, the study shows that direct reforms such as caps on noneconomic damages increased cesarean delivery rates with no impact on birth outcomes. On the other hand, the abolishment of

joint and several liability actually reduced cesarean procedures and birth complication rates. Joint and several liability reform removes the option for plaintiffs to pursue any one of multiple tortfeasors who are jointly responsible for the plaintiffs' injuries for the entire sum of the damages. Currie and McLeod conjecture that by more closely aligning malpractice liability and providers' standard of care, joint and several liability reform dissuades physicians from performing unnecessary cesarean deliveries in marginal cases in which vaginal birth may in fact be the less risky option.

A recent study that investigates the impact of tort reforms on an extended patient population, beyond elderly cardiac patients and pregnant women, concludes that reforms had no systematic impact on Medicare payments or patient survival rates (FA Sloan and JH Shadle, 2009). The authors examine nine disease conditions, including heart attack, diabetes, stroke, and breast cancer, from the National Long-Term Care Survey data merged with Medicare claims data from 1985 to 2000. They conclude that direct reforms had no impact on payments or health outcomes in any specification, and that indirect reforms reduced hospital expenditures only in a specification that included all-cause hospitalizations. Sloan and Shadle infer from the results that contrary to popular belief, tort reforms do not appear to contain costs or reduce defensive medicine.

This paper is most similar in spirit to Currie and McLeod (2008) in two respects. First, it focuses on pregnancies, and second, it corroborates the hypothesis that aligning incentives with the standard of care may reduce riskier procedures. At the most general level, it also shows the negation of the empirical findings of Kessler and McClellan (1996) by demonstrating that *increasing* provider liability may lead to *more* defensive medicine (even when the policy change is indirect). However, this paper extends both papers by showing that shifting burdens of proof

(the essence of the strict liability doctrine) may also have an impact on physician behavior. It isolates the pure effect of liability risk in a health care system that lacks malpractice insurance, and demonstrates that as such, organizational forms that increase exposure to malpractice risk may be conducive to the practice of defensive medicine. Furthermore, this paper suggests that payment incentives interact with the propensity to practice defensive medicine, enhancing such practice when it is profitable to do so and mitigating the effects when defensive medicine is costly. I also show that the wasteful use of health services to defend against liability risk is not a unique product of the Anglo-American common law tort system. Finally, although the overall impact of changing malpractice liability appears small, to the extent that physician-owners of clinics may be less risk-averse than physician-employees, this paper may underestimate the impact of liability risks on obstetrician behavior.

3 Context and Hypotheses Generation

3.1 Health Care in Taiwan

Since 1996, Taiwan has provided universal health care to all citizens and legal residents in its jurisdiction. The National Health Insurance Bureau contracts with virtually all private and public providers at standardized prices for all reimbursed ambulatory and inpatient services, medical materials, and prescription medications. For the same services, prices differ only with respect to the accredited category of the providers, with medical centers receiving the highest pricing and clinics the lowest. Taiwanese providers are generally paid on a fee-for-service basis, and physicians are either owners of clinics (or local hospitals) or salaried employees of hospitals or clinics. Despite the existence of three levels of care, the division between the types of medical

providers is often blurred. Medical centers operate large outpatient clinics where physicians treat the common cold and do routine antepartum screening, and clinics often have inpatient beds and have doctors who perform both vaginal and cesarean deliveries.

Disputes over medical injuries are common, and a Taiwanese survey reveals that 44% of practicing physicians in 1991 had at one time or another been involved in such disputes. Of these cases, 42.3% were dropped, 42% were settled, and 15.7% resulted in a civil or criminal suit. Patients prevailed in just 3.4% of court cases, or less than 0.54% of all medical disputes. However, almost 42.5% of all patients received some form of compensation (Rong-Chi Chen, 1992). A second survey conducted in 2005 shows that malpractice disputes continue unabated, with the number of cases under review by Taiwan's Medical Professions Review Board quadrupling from 1987 to 2002 (Jun-Ying Wu et al., 2009).

3.2 The Taiwanese Legal System and Malpractice Liability

There are two legal bases for judicial adjudication of medical disputes in Taiwan. Tort liability arises from Part II (Debts) Subchapter 5 of the Civil Code, when an individual causes damages to another because of his or her negligence or intentional act. Taiwan law also punishes physicians for harm arising from medical error under Article 276 of the Criminal Code, which sanctions injury caused in the performance of a professional duty. Both bodies of law[4] require plaintiffs (or the prosecutor) to demonstrate defendants' fault – either negligence or an intentional act – to prevail in court. There are three levels of judicial review, beginning with the court of first instance (the district court), followed by the high court and the supreme court. There are currently 19 district courts located around Taiwan and one high court seated in Taipei,

[4] See Legal Appendix for the text of the relevant laws in the original language.

with four branches of the high court located in Taichung, Tainan, Kaohsiung, and Hualian. The single Supreme Court of Taiwan is the court of final appeal for all civil disputes except those not exceeding NT$1,500,000 (US$50,000)[5] and all criminal proceedings except certain petty offenses in the Criminal Code.

In 1998, a controversial district court ruling (Taipei District Court Civil Suit No. 5125, 1996) reverberated through the Taiwanese medical world when the judge applied a third body of law, the Consumer Protection Law, to impose liability on a medical provider absent any showing of negligence or criminal malfeasance. In the malpractice suit in question, a fetus experienced shoulder dystocia during a woman's second vaginal delivery. The attending physician performed an emergency McRoberts maneuver and successfully delivered the infant, who subsequently suffered from brachial plexus palsy due to the obstructed birth. The parents brought a civil as well as criminal suit against the hospital but lost on both counts. However, the court applied the Consumer Protection Law and awarded NT$1,000,000 (approximately US$33,000) to the plaintiffs.

The official English translation of Article 7 of Taiwan's Consumer Protection Law reads:[6]

> Business operators engaging in the design, production or manufacture of goods or in the provisions of services shall ensure that goods and services provided by them meet and comply with the contemporary technical and professional standards of the [sic] reasonably expected safety prior to the sold goods launched into the market, or at the time of rendering services.
>
> Where goods or services may endanger the lives, bodies, health, or properties of consumers, a warning and the methods for emergency handling of such danger shall be labeled at a conspicuous place.

[5] The dollar requirement in 2001, at the time of the supreme court decision in the case at hand, was NT$1,000,000.
[6] See Legal Appendix for the text of the law in the original language.

> Business operators violating the two foregoing two paragraphs and thus causing injury to consumers or third parties shall be jointly and severally liable therefor, provided that if business operators can prove that they are not guilty of negligence, the court may reduce their liability for damages.

In arriving at her conclusion, the Taipei District Court judge ruled that the defendant cannot be held accountable under the Civil or Criminal Codes because his action constituted neither negligence nor willful misconduct. However, the court found that the defendant failed to inform the plaintiff of the high likelihood of shoulder dystocia based on the infant's estimated weight and the mother's weight. For this reason, the judge ruled that the defendant violated Section 2 of Article 7 of the Consumer Protection Law, and ordered him to pay the plaintiffs compensatory damages of NT$1,000,000 (US$33,000). The defendant appealed to the high court, which affirmed the district court's decision, again citing the defendant's failure to inform (Taipei High Court Civil Appeal Suit No. 151, 1998). Finally, the Supreme Court of Taiwan, without ruling on the merits, affirmed the applicability of the Consumer Protection Law but remanded the case to the Taipei High Court to determine whether the defendant's actions met the "reasonable safety expectations" requirement in Section 1 of Article 7 of the law (Taiwan Supreme Court Appeal Suit No. 709, 2001). The plaintiffs and defendant subsequently settled the case out of court for an undisclosed sum.

The controversy engendered by the series of judicial decisions, however, continued to rage on long after the settlement of the original dispute. Legal scholars and medical professionals engaged in heated debates on (1) whether medical services constitute a "service" covered under the Consumer Protection Law and (2) whether the strict liability doctrine is appropriate in the highly unpredictable art of medicine. Proponents of the rulings argue that the practice of medicine encompasses both a "product" (prescription drugs, medical materials) and a "service"

(diagnosis of disease, administration of vaccines and medications), and is thus well within the purview of the Consumer Protection Law. To these proponents, the applicability of the law helps ensure the safety and rights of the patients. Opponents of the rulings argue that the rationales for strict liability simply do not exist in medical services. Taiwanese medical professionals argue that the practice of medicine is custom-tailored to each patient, unlike mass-produced products and services. Further, physicians, unlike other purveyors of products of services, generally have no right to refuse services to their clients. Finally, physicians' groups point out that general products are "safe," whereas medical services must inherently address that which is "dangerous and unsafe." This last point contradicts the essential rationale for strict liability in the American legal tradition, which first applied the doctrine to inherently unsafe activities and subsequently to defective products (see e.g., *Escola v. Coca-Cola Bottling Co*., 24 Cal. 2d 453, 462 [1944]). Nevertheless, American courts have traditionally been reluctant to extend the doctrine to medicine because of the uncertainty of medical services, fears of cost increases, and the potential for hampering medical innovation (BR Furrow et al., 2000). (See also *Cafazzo v. Central Medical Health Services*, 668 A.2d 521 [Pa. 1995]) In the wake of the debates, the Taiwanese legislature amended the Medical Law in April 2004, requiring negligence or fault for liability in medical malpractice cases.

3.3 Hypothesis Generation

Despite the intensity of the scholarly disputes about the applicability of the Consumer Protection Law to health care, no research empirically examined the actual impact of the legal cases on physician behavior in Taiwan. In essence, the series of judicial decisions beginning in 1998 strengthened plaintiffs' position relative to that of physicians by lowering patients' burden of proof, and increased malpractice risk for medical service providers. Based on the existing

literature on defensive medicine, I hypothesize that physicians in Taiwan will display behavior consistent with the practice of defensive medicine.

First, in a fee-for-service system, physicians exposed to higher malpractice liability can accomplish the dual goal of generating income and reducing medico-legal risks by ordering more laboratory tests. However, they should not increase services that do not protect the physicians against malpractice claims, such as prescribing more drugs or ordering radiological services. I expect to observe the following behavior both in the inpatient and outpatient care settings.

> **H1**: Physicians faced with higher malpractice liability will increase laboratory tests and laboratory expenditures.

> **H2**: Physicians faced with higher malpractice liability will not increase drug prescriptions.

> **H3**: Physicians faced with higher malpractice liability will not increase radiology expenditures.

To the extent that additional (and perhaps unnecessary) tests, although profitable for physicians, are often inconvenient and expensive for patients, physicians may decrease test-ordering behavior if malpractice pressures are lowered.

> **H4**: Physicians faced with reduced malpractice liability will decrease laboratory tests and expenditures.

With respect to procedure choice, although conventional wisdom predicts higher cesarean rates when physicians are confronted with greater malpractice risk, I follow the prediction of Currie and McLeod (2008) – that is, when physicians are individually responsible for their choice of treatment, higher malpractice pressure should reduce the likelihood of unnecessary and risky procedures, such as cesarean sections.

H5: Physicians faced with higher liability risk will decrease the likelihood of performing cesarean sections.

When such liability fears are allayed, however, physicians may find it tempting to provide riskier, but more profitable, services again.

H6: Physicians facing reduced liability risk will increase the likelihood of performing cesarean sections.

Finally, to bolster the claim of defensive medicine, I must also show that the above changes in physician behavior do not adversely impact patient health. In this preliminary version of the paper, I show that delivery complication rates do not change whether physicians increase or decrease laboratory tests or cesarean rates in response to changing malpractice pressures.

H7: Patients of physicians who react to changing liability risks do not experience a higher rate of delivery complications.

In a future version of this paper, I will also investigate more objective measures of patient health outcomes, such as emergency room use and hospital readmission rates of patients treated by physicians who alter their treatment decisions when liability risk levels change.

4 Data and Methodology

4.1 Data

Data for this empirical research derive from random subsamples of the entire population of outpatient and inpatient claims in Taiwan from 1997 to 2004. The National Health Insurance Research Institute of Taiwan provides a 1-in-500 and a 1-in-20 subsample of all outpatient and inpatient claims generated from contracted medical providers for reimbursable services. These

data sets are noteworthy for their national representativeness and freedom from data censorship problems – virtually all medical providers contract with the National Health Insurance Bureau, and virtually all residents are covered by nationalized health care. In particular, the data sets provide unique patient, provider, and physician identification numbers, allowing the researcher to analyze the data at the individual office visit or inpatient admission level.

The outpatient data are particularly rich, providing all relevant information necessary for claims processing – including the quantities and types of services provided, the drugs prescribed, the procedures performed, and the laboratory tests ordered – as well as diagnosis codes and basic patient, physician, and provider characteristics. The inpatient data provide fewer details about the types of laboratory tests and drugs administered during hospitalization, but they do give the expenditures for these services. In addition, the inpatient data also include diagnosis codes, (surgical) procedure codes, length of stay, and aggregate expenditures separated by type of services (e.g., laboratory test, drug, radiology, physical therapy, dialysis, blood transfusion, and anesthesia expenditures). Like the outpatient data, the inpatient claims also give basic patient, physician, and provider characteristics.

4.2 Dependent and Independent Variables

From the master outpatient and inpatient data files, I culled all observations with at least one diagnosis code related to pregnancy. All observations are at the outpatient office-visit or inpatient admission level. On the outpatient side, I collected all observations with "antepartum screening" or "normal supervision of pregnancy" as one of the diagnosis codes. For the inpatient data, I kept all observations with any of the ICD9-CM (International Classification of

Diseases, 9th Revision, Clinical Modification) codes for "complications of pregnancy, childbirth, or the puerperium," or codes 630 to 679.

The primary dependent variables are various measures of utilization intensities for services commonly associated with the practice of defensive medicine. On the outpatient side, I include the number of different laboratory tests ordered during routine antepartum screening. The National Health Insurance Bureau reimburses pregnant women for 10 outpatient visits for routine supervision of pregnancy. Each specific visit has a baseline number of tests – for example, for the first visit (within 12 weeks of pregnancy), the National Health Insurance covers a battery of physical tests, blood work, and laboratory tests, but patients may opt to pay out of pocket for an ultrasound or tests to detect Down syndrome. For the third visit, the insurance covers an ultrasound, detection of high-risk pregnancies, and a glucose tolerance test. Patients may pay extra for high-resolution ultrasound. For my purposes, I exclude the covered services associated with each routine screening visit, and count only the **number of optional tests** ordered or performed during the office visit. Note that any test, such as an ultrasound, may be optional or covered depending on when the test is administered. I also construct the aggregate **laboratory expenditures**, **drug expenditures**, **radiological expenditures**, and **treatment expenditures** (minor nonsurgical procedures) as well as dummy variables (called "**laboratory dummy**," "**radiological dummy**," "**drug dummy**," and "**treatment dummy**"), which are set to 1 if the respective expenditure amounts are greater than zero. I also tabulate the **number of different drugs prescribed** during the visit. Finally, I construct dummy variables to indicate whether physicians prescribed certain **types of tests**, such as ultrasound alone; infection tests; fetal position tests; blood work; and ultrasound, pelvic examination, and fetal heart monitoring combined.

The control variables for the outpatient data include **patient age**, **quarter dummies**, **regional dummies**, and a dummy variable each for the presence of **complications of pregnancy** or **non-pregnancy-related complications** (such as having a common cold).

For the **inpatient data**, I construct the aggregate expenditures for each hospital admission for **laboratory expenditures**, **drug expenditures**, **treatment expenditures** (any minor nonsurgical procedures), and **radiological expenditures**, as well a dummy variable for whether a **cesarean section** was performed during the inpatient stay. The independent variables are the same as those included for the outpatient data, with the addition of a dummy variable indicating the presence of a **complication relating to childbirth**.

4.3 Summary Statistics

As an exploratory analysis, I present the summary statistics for the outpatient and inpatient data separately, divided by provider type and time period (before district court ruling, after district court ruling, after high court ruling, after supreme court ruling, and after medical law amendment). As whole, there are 45,887 observations for the outpatient data set, and 2,249,144 observations for the inpatient data. Two trends immediately stand out: a general temporal trend in growth in all expenditures regardless of provider type, and a correlation between greater expenditures and higher-level providers. See Table I for the outpatient summary statistics and Table II for the inpatient statistics.

More closely related to my empirical inquiry, there appears to be a significant change in behavior at the clinic level immediately after the Taipei District Court ruling. For the outpatient data, it is noteworthy that there was a jump in the average number of optional laboratory tests ordered, from 0.57 before the district court ruling to 0.79 afterward. Such dramatic changes are

not observed for local or regional hospitals and medical centers. Likewise for the inpatient setting, clinics more than doubled laboratory, drug, and treatment expenditures, whereas other types of providers showed only a gradual increase in such expenditures. Average laboratory expenditures grew from NT$422 (US$13.19) to NT$995 (US$31.09) after the Taipei District Court ruling, treatment expenditures from NT$1,598 (US$49.94) to NT$3,035 (US$94.84), and surgical expenditures from NT$3,427 ($107.09) to NT$8,085 (US$252.66). This growth occurred without any adjustment to the reimbursement rates for services performed at clinics. The other noteworthy fact is that the jump in expenditures occurred only after the district court decision, not following the higher court rulings.

4.4 Methodology

The summary statistics are highly suggestive that clinics, which face higher malpractice liability than larger providers because their physicians must generally pay civil awards and settlements out of pocket, appear to engage in some type of defensive medicine after the district court ruling. To better isolate the possible causal link between liability risk and defensive medicine, I use a difference-in-differences estimation methodology that controls for confounding factors such as patient age, complications, and geographical and temporal differences in practice styles. As previously explained, Taiwan's continental civil law tradition does not definitively permit using jurisdictions outside of the Taipei District Court (or later, a higher court) as the control group. The reason, again, is that Taiwan's judges are not bound by *stare decisis*: each judge is free to interpret the law according to the doctrine of *intime conviction.*

For this reason, the empirical methodology is driven by two sources of variation. One source is based on the different exposure risks faced by physician-owners of clinics versus physician-

employees at larger providers (see Table III for rates of physician ownership by provider type). Significantly, almost 62% of physicians at clinics are owners of their own practices, and these physician-owners are much more likely to be considered "business operators" according to the Consumer Protection Law than physicians who are salaried employees at larger hospitals. The other source of variation is based on possible differences in physicians' perception of the likelihood that judges in their jurisdiction will apply the Consumer Protection Law. For example, even though a court in Kaohsiung may decide to follow the Taipei District Court's interpretation of the law, physicians in Kaohsiung may not perceive as great an increase in malpractice pressure as physicians in Taipei.

For cross-provider comparisons, the econometric specification takes the following form:

$$y_{it} = \beta_0 + \beta_1 \cdot post \times owner + \beta_2 \cdot post \times local + \beta_3 \cdot post \times regional + \beta_4 \cdot post + \beta_5 \cdot owner + \beta_6 \cdot local + \beta_7 \cdot regional + \boldsymbol{\gamma}\mathbf{X} + \alpha_i + \varepsilon_{it} \quad (1.1)$$

Here, the independent variables are measures of utilization intensities for certain health services, such as laboratory tests, prescription drugs, surgeries, treatments, and cesarean sections. I also examine the specific type of tests (ultrasound alone, tests to determine fetal position, infection tests, and blood work) that are increased or decreased when liability pressures change. The variable *post* takes on the value 1 after the district court, high court, and supreme court decisions, as well as after the law amendment in 2004, as follows: The data are separated into four groups: (1) from January 1, 1997, to September 1, 1999 (covering the period before and after the district court ruling, but before the high court ruling); (2) from January 1, 1998, to May 10, 2001 (before and after the high court ruling); (3) from September 1, 1999, to September 1, 2002 (before and after the supreme court ruling); (4) and April 1 to July 30, 2004 (before and after the medical malpractice law amendment). Again, the variable *post* takes on the value 1 after

the district court ruling in subset 1 and is likewise set to 1 after the high court ruling in subset 2, after the supreme court ruling in subset 3, and after the medical law amendment in subset 4. To better isolate the effect of the changes, I set the upper limit for the pre- and post- periods at a maximum of 1.5 years. All econometric specifications include physician fixed effects, and the control variables are as described in Section 4.2.

In this specification, the primary coefficients of interest are β_1, β_2, and β_3. In particular, to support the defensive medicine hypothesis, the first coefficient (reflecting changes in the behavior of physician-owners relative to physicians at medical centers) should be positive and significant for laboratory tests and negative and significant for cesarean sections when malpractice liability pressure is increased. I expect the signs to reverse when the pressure is decreased. On the other hand, if physicians at local and regional hospitals face less pressure because most of them are not "business operators" and have access to a reserve fund for malpractice awards or settlements, I do not expect the coefficients on β_2 and β_3 to be statistically significant.

For the second specification, I investigate whether physician-owners of obstetric clinics in districts under the jurisdiction of the Taipei District Court make different treatment decisions from physician-owners of obstetric clinics in Taiwan's second-largest city, Kaohsiung, located at the opposite end of the island. The econometric model is as follows:

$$(1.2)\quad y_{it} = \beta_0 + \beta_1 \cdot post \times treated + \beta_2 \cdot post + \beta_3 \cdot treated + \boldsymbol{\gamma}\mathbf{X} + \alpha_i + \varepsilon_{it}$$

Here, the variable *post* takes on the value 1 in the four different subsets of the data as described above, with the difference that in this specification, only observations from the relevant districts in Taipei and Kaohsiung are included. The variable *treated* is 1 if the clinic is

located in Taipei, and the coefficient of interest is β_1. As in the previous specification, I expect the coefficient to be positive and significant for laboratory tests and negative and significant for cesarean sections (following Currie and McLeod [2008]) when malpractice risks are increased. Again, the signs should reverse if malpractice risks are lowered. Note that the regional dummies are not included in this specification because only two cities are present in the database.

To provide a first view of the effect on health outcomes arising from any changes in physician behavior in response to malpractice pressure, I use the dummy variable "complications" as the dependent variable in the two specifications above. (In a further iteration of this work, once I receive a more comprehensive data I will examine the health service utilization rates of women during and after delivery.)

Finally, to check the robustness of the findings, I perform one of two tests. In the first test, I look at whether the key dependent variables had similar trends prior to any court ruling among physicians at different types of providers. This is accomplished by dropping all post–district court ruling data and running the following specification:

$$(1.3)\quad y_{it} = \beta_0 + \sum_{j=1997q2}^{1997q4} \beta_{1j} \cdot quarter\ dummy_j + \sum_{j=1997q2}^{1997q4} \beta_{2j} \cdot quarter\ dummy_j \times owner + \beta_3 \cdot owner + \boldsymbol{\gamma}\mathbf{X} + \alpha_i + \varepsilon_{it}$$

If there were no preexisting trends between physician-owners and other physicians before the district court ruling (demonstrated by nonsignificant β_{2j}), then any statistically significant coefficients of model (1.2) would unlikely reflect results of converging or diverging preexisting

trends. The second robustness check I perform, for model (1.1), is a falsification test. I randomly select a fictitious "policy change" date of June 30, 1997, drop all observations following January 2, 1998 (the date of the district court ruling), and examine whether the results remain statistically significant. If they do not, we can be more certain that the district court ruling (or higher court rulings or the amendment of the law) had a real impact on physician behavior.

5 Results, Robustness Checks, and Discussion

As a whole, all the hypotheses are substantiated, lending credible support to the defensive medicine hypothesis. In both inpatient and outpatient settings, physician-owners increased the number or likelihood of laboratory tests ordered after the Taipei District Court ruling. In outpatient settings, physician owners increased laboratory tests by 0.21 tests, whereas local and regional hospital physicians made no such change (Table IV). Taipei physician-owners increased the number of discretionary tests by 0.76 more than Kaohsiung physician-owners after the district court ruling (Table V).In particular, physicians tended to order more tests that include ultrasounds, pelvic examinations and fetal heart monitoring (which I call "fetal tests") rather than tests for infections, blood work, or ultrasounds alone (Table V.A).

Because expenditures in the aggregate are difficult to compare across provider types, for inpatient expenditures, I compare the behavior of Taipei and Kaohsiung physician-owners. In inpatient settings, although physician-owners in Taipei did not increase laboratory expenditures relative to physician-owners in Kaohsiung *conditional on ordering tests* (Table VI), the likelihood of ordering a test was 39% higher in Taipei than in Kaohsiung following the district court decision (Table VII). However, in comparing the behavior of Taipei and Kaohsiung physician-owners, I find that the likelihood of treatments and surgeries also increased in Taipei,

although no such change was observed for radiology (see also Table VII). Nevertheless, hypothesis 1 is, as a whole, confirmed: physicians facing higher malpractice liability appear to increase the number of tests, or the likelihood of ordering tests. It is noteworthy that no further increases were observed after the high court and supreme court decisions, perhaps reflecting the fact that the National Health Insurance Bureau may not reimburse physicians for tests it considers arbitrary or excessive. Patients, who must pay out of pocket for discretionary laboratory tests, may also limit physicians' ability to perform or order tests without limit.

Hypotheses 2 and 3 are also corroborated. In outpatient settings, physician-owners did not increase drug expenditures relative to medical center physicians after the district court made its ruling (Table VIII). Moreover, Taipei physician-owners did not increase the number of different drugs they prescribed any more than Kaohsiung physician-owners did following the district court ruling (Table V). On the inpatient side, however, Taipei doctors did increase the likelihood of non-zero surgery and treatment expenditures relative to Kaohsiung doctors after the district court decision, but these increases are not necessarily inconsistent with the defensive medicine hypothesis. In Table V, I show that Taipei doctors did not increase the likelihood of non-zero radiological expenditures relative to Kaohsiung doctors, consistent with the predictions of hypothesis 3.

Hypothesis 4 is corroborated when we compare the test-ordering behavior of physician-owners relative to medical center physicians in outpatient settings. After the law was amended to require proof of negligence or fault in a civil medical malpractice suit, physician-owners reduced the number of voluntary tests by 0.07, but physicians at local and regional hospitals showed no such change (Table IX). Moreover, the reduction occurred mostly for the fetal tests described earlier (Table IX.A). No such reduction is observed in the inpatient setting, however, when

comparing Taipei and Kaohsiung physicians' laboratory expenditures and likelihood of ordering a laboratory test (Tables VI and VII).

Following Currie and McLeod (2008), I hypothesize that when liability is closely aligned with physicians' individual standard of care, higher malpractice liability may lead to a reduction in cesarean sections. This hypothesis, or hypothesis 5, is confirmed in my empirical examination. When I compare physician-owners in Taipei and Kaohsiung, I find that Taipei doctors reduced their likelihood of cesarean section by –2.5% relative to Kaohsiung doctors after the district court decision (Table X). Comparing across provider types, I find that physician-owners reduced the likelihood of cesarean deliveries by a minuscule percentage (–0.8%) relative to medical center doctors only after the supreme court decision (Table XI).

Hypothesis 6 is confirmed when I look at the cross-provider comparison of likelihood of cesarean sections. After the law was amended to require proof of negligence or fault for malpractice liability, physician-owners increased the likelihood of cesarean sections by 2.3% relative to medical center physicians (Table IX). The model that compares Taipei and Kaohsiung physicians, however, did not yield a statistically significant result either way (Table X). However, it is worth nothing that the justification for comparing Taipei and Kaohsiung physicians becomes less and less solid as the case proceeded through the higher courts in the sense that physicians in Kaohsiung may have perceived the supreme court decision as having more weight than the decision of a district court located far away.

Finally, in future iterations of this paper, I intend to look at patient health outcomes by postpartum visits to the hospital or clinics. For this empirical examination, I will need access to a much larger panel data set than I currently have. However, with full recognition that the

diagnosis codes that physicians decide to include in the patients' charts are subject to manipulation, I note that the complication rates of patients treated by physician-owners remain relatively constant throughout the years. This is a first attempt to show that all changes in the behavior of physician-owners did not appear to affect patient health outcomes, as hypothesis 7 predicts. If anything, there was a statistically significant reduction in the likelihood of delivery complications reported by physician-owners relative to medical center doctors following the district court decision, with no change in the likelihood of cesarean sections. This reduction in the reporting of delivery complications, however, may well have been an attempt by the physician-owners to demonstrate that there was no error or problem during the course of delivery, rather than a real reduction in complications.

The results as a whole are highly suggestive of the practice of defensive medicine in response to changing malpractice pressures. When physicians faced higher malpractice risk, they increased the number or likelihood of laboratory tests both in inpatient and outpatient settings. The tests that saw the greatest increases are also those most likely to serve medico-legal purposes, rather than routine blood tests, infection tests, or ultrasound alone. When the malpractice risk was lowered, physicians appeared to perform or order fewer tests, especially those that they had increased after the district court ruling.

Consistent with Currie and McLeod (2008), my findings show that increased liability is associated with a reduced likelihood of cesarean deliveries when the increase in liability is closely aligned with the physician's own actions. When the law was amended to decrease physicians' liability risks, cesarean rates rebounded. The finding that physicians altered their procedure choice in response to liability risks without affecting delivery complications supports an inference of defensive medicine. Furthermore, the fact that cesarean deliveries represent 30%

to 40% of all births in Taiwan, greatly exceeding the World Health Organization (WHO) recommendation of 10%, suggests that cesarean sections are over utilized in Taiwan. As such, physicians likely had discretion in most cases to choose between cesarean or vaginal deliveries, so the observed changes in procedure choice are unlikely to be driven by patient need.

Throughout the legal rulings and law amendment, the reported delivery complications remained relatively constant, with few statistically significant changes that contradict the existence of defensive medicine.

5.1 Robustness Checks

The results reported in the preceding section may be invalidated if the statistically significant positive or negative changes associated with physician-owners' behavior were merely results of preexisting diverging or converging trends. A preexisting trend would greatly undermine the causal interpretation of the various court rulings and law amendment on physician behavior. To address this possibility, I ran the various robustness and falsification specifications described in Section 4.4. All the results confirm that there was either no preexisting trend between the treatment and control groups or that a randomly selected "fictitious" treatment date did not yield any statistically significant results. In Table XII, I show that there were no preexisting trends between the number of tests ordered by physician-owners relative to all other physicians who are salaried employees at hospitals or medical centers. In Table XIII, we see that a randomly selected date of June 30, 1997 (before the district court ruling), did not result in a statistically significant reduction in the likelihood of cesarean sections by Taipei doctors relative to Kaohsiung physicians.

6 Conclusion

As nations around the globe face increasing health expenditures, policy makers are naturally eager to uncover the drivers of cost escalation. In the United States, the cost of defensive medicine is a point of contention between proponents and opponents of tort reforms. Not only do researchers disagree on the extent of defensive medicine, but some even question its very existence. This paper joins the debate by offering additional evidence that defensive medicine exists even in a country in which heated discussions about tort reforms are absent. In other words, not only does defensive medicine exist, but it may be far more prevalent than some would acknowledge.

In this paper, I show that physicians increase laboratory tests when malpractice fears are raised, and decrease them when the fears are lessened. They also increase or decrease the likelihood of performing cesarean sections as malpractice risks ebb and flow, without consistently increasing other discretionary expenditures or changing at least one aspect of patient health outcomes. This pattern of events is highly suggestive of the existence of defensive medicine in Taiwan.

Aside from the primary goal of demonstrating the existence of defensive medicine, my work also suggests the existence of a variety of mediators that influence the strength and extent of defensive medicine. First, the perception of legal risks may have a substantial impact on physician behavior regardless of the real effect of the law. In Taiwan, a local district court ruling is neither binding nor necessarily influential on the decisions of other courts. However, the saliency of this case, combined with the novel application of a relatively new law, may have

prompted physicians to turn more decisively toward defensive medicine than a simple district court decision would have elicited under other circumstances.

Second, payment incentives appear to be a strong mediator. In a fee-for-service environment, doing more almost always results in higher income. To the extent that ordering more tests both increases income and defends against legal liability, physicians appeared especially willing to engage in this type of defensive medicine. On the other hand, cesarean sections are twice as profitable as natural births, and the low probability of malpractice liability relative to certain higher revenues may have made physicians more reluctant to reduce cesarean rates when liability risks increased. Although Taipei physician-owners reduced the likelihood of performing cesarean deliveries quickly compared to physician-owners in Kaohsiung, physician-owners in Taiwan as a group did not decrease cesarean sections relative to physician-employees at medical centers until the supreme court decision. However, physician-owners in Taiwan immediately increased cesarean rates relative to their colleagues at larger hospitals after the law was amended to decrease malpractice risks. In other words, physicians reduced profitable cesarean sections less readily than they increased income-generating diagnostic tests in the face of increasing medical liability. They then increased profitable cesarean sections more decisively than they reduced diagnostic tests when liability fears abated.

Third, patients' out-of-pocket expenses may matter as well. Profit-maximizing physicians had no financial incentive to reduce laboratory tests after the legislature amended the Medical Law. However, the extra tests that physicians ordered were those that patients had to pay for out of pocket. When the liability pressures were alleviated, physicians may have had second thoughts about imposing those extra costs on patients and therefore began doing fewer discretionary tests. Nevertheless, they reduced these tests after the legal amendment at a more

tepid rate than they had increased diagnostic tests when liability risks heightened following the district court ruling.

Fourth, incremental changes in behavior may not necessarily exist. In theory, a perfectly rational physician would increase her defensive medicine practices only enough to offset the increase in medical liability. In this case, we should theoretically have observed a small jump in defensive medicine after each higher court ruling affirmed the applicability of the Consumer Protection Law to medical malpractice cases. Instead, we saw a large jump after the first ruling and no increase after subsequent rulings. Perhaps there are only so many tests that can be done, and the upper limit acceptable to either the patient or the National Health Insurance Bureau was quickly reached. Empirically, this suggests a step function between malpractice liability levels and test-ordering behavior, so that not every increase in liability automatically results in a growth in laboratory tests.

Fifth, organizations mediate the way defensive medicine operates by altering risk levels for physicians. In a world without liability insurance, physicians at medical centers and hospitals, where risks are spread over a large number of colleagues, appear to be less prone to practicing defensive medicine than are physicians who must fully bear the burden of court awards or settlements arising from medical malpractice.

My work informs policy in several important ways. (1) With payment incentives and organizational differences mediating the extent of defensive medicine, it is difficult to extrapolate the findings of a particular study to the entire medical service industry. (2) Reforms are not merely about reducing liability but aligning risks and behavior. So much of tort reform policy in the United States is concerned with astronomical jury awards, and reform advocates are

especially interested in "caps" and the abolishment of punitive damages in order to reduce wasteful practices of defensive medicine. More closely aligning liability with physicians' individual standard of care may achieve a more rational response to malpractice liability. On the other hand, closer alignment may come at the cost of exacerbating the undercompensation of patients with meritorious malpractice claims, if reforms such as the removal of the joint and several liability rule make it harder for such patients to prevail in court. (3) When addressing the likelihood and extent of defensive medicine, policy makers should consider whether or not payment incentives and defensive medicine are aligned. When they are not aligned, perhaps we should be less concerned with the existence, or at least extent, of wasteful medical practices to manage legal risk. (4) Finally, my findings echo those of previous studies that suggest that certain organizational forms may be less likely to be plagued by defensive medicine – such as large providers in Taiwan and health maintenance organizations in the United States (Ronen Avraham et al., 2009).

Despite the consistent results of this study, several challenges do remain. To the extent that this paper examines a high-risk specialty, the results may not necessarily translate into policy implications for other medical specialties. Furthermore, this article examines the impact of a case that was extremely salient during its time. Other malpractice cases decided by district courts or, for that matter, by the supreme court in a legal tradition that imposes no *stare decisis* may not necessarily have the same impact. On the other hand, the empirical strategy of my work rests on the differential malpractice risks of physician-owners and non-owners, and to the extent that owners tend to be less risk-averse, the results of my paper may underestimate the extent of defensive medicine in obstetrics. Finally, my work does not address alternatives to the legal adjudication of medical disputes. Aside from closing the gaps in this paper, future research might

concentrate on whether completely removing certain medical cases from the legal system promotes carelessness and negligence

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Legal Appendix

法規： 民法 (民國 99 年 01 月 27 日修正)

第 184 條 （獨立侵權行為之責任）

因故意或過失，不法侵害他人之權利者，負損害賠償責任。故意以背於善良風俗之方法，加損害於他人者亦同。

違反保護他人之法律，致生損害於他人者，負賠償責任。但能證明其行為無過失者，不在此限。

第 185 條 （共同侵權行為責任）

數人共同不法侵害他人之權利者，連帶負損害賠償責任;不能知其中孰為加害人者，亦同。

造意人及幫助人，視為共同行為人。

Title: Civil Code (Amended January 27, 2010)
Subsection 5 Torts

Article 184

A person who, intentionally or negligently, has wrongfully damaged the rights of another is bound to compensate him for any injury arising therefrom. The same rule shall be applied when the injury is done intentionally in a manner against the rules of morals.

A person, who violates a statutory provision enacted for the protection of others and therefore prejudice to others, is bound to compensate for the injury, except no negligence in his act can be proved.

Article 185

If several persons have wrongfully damaged the rights of another jointly, they are jointly liable for the injury arising therefrom. The same rule shall be applied even if which one has actually caused the injury cannot be sure.

Instigators and accomplices are deemed to be joint tortfeasors.

法規：中華民國刑法 (民國 98 年 12 月 30 日修正)

第 276 條

（過失致死罪）

因過失致人於死者，處二年以下有期徒刑、拘役或二千元以下罰金。

從事業務之人，因業務上之過失犯前項之罪者，處五年以下有期徒刑或拘役，得併科三千元以下罰金。

Title: Criminal Code (Amended December 30, 2009)

Article 276 Negligent Homicide

A person who negligently kills another shall be punished with imprisonment for not more than two years, detention, or a fine of no more than $2,000 yuan.

A person engaged in the operation of a business, who violates the previous section as a result of negligent operation of the business, shall be punished with imprisonment for not more than five years or detention, and may additionally be imposed a fine of no more than $3,000 yuan.

法規名稱：消費者保護法 (民國 94 年 02 月 05 日修正)

第 二 章 消費者權益

第 一 節 健康與安全保障

第 7 條

（企業經營者就其商品或服務所應負之責任）

從事設計、生產、製造商品或提供服務之企業經營者，於提供商品流通進入市場，或提供服務時，應確保該商品或服務，符合當時科技或專業水準可合理期待之安全性。

商品或服務具有危害消費者生命、身體、健康、財產之可能者，應於明顯處為警告標示及緊急處理危險之方法。

企業經營者違反前二項規定，致生損害於消費者或第三人時，應負連帶賠償責任。但企業經營者能證明其無過失者，法院得減輕其賠償責任。

Title： Consumer Protection Law (Amended February 5, 2005)

Chapter II – Interests of Consumers

Subchapter One – Safeguarding of Health and Safety

Article 7

Business operators engaging in the design, production or manufacture of goods or in the provisions of services shall ensure that goods and services provided by them meet and comply with the contemporary technical and professional standards of the [sic] reasonably expected safety prior to the sold goods launched into the market, or at the time of rendering services.

Where goods or services may endanger the lives, bodies, health or properties of consumers, a warning and the methods for emergency handling of such danger shall be labeled at a conspicuous place.

Business operators violating the two foregoing two paragraphs and thus causing injury to consumers or third parties shall be jointly and severally liable therefor, provided that if business operators can prove that they are not guilty of negligence, the court may reduce their liability for damages.

List of Tables

Table I: Summary Statistics

By Provider Type and Period for Outpatient Antepartum Examinations in Taiwan, 1997-2004

Clinics

	Pre-Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Laboratory Expenditures	2,181	272.70	359.77	3,400	285.01	497.97	4,038	335.70	677.00	6,619	390.05	666.45	560	533.31	829.89
Drug Expenditures	2,181	39.16	92.97	3,400	46.53	115.01	4,038	36.06	67.33	6,619	35.36	67.92	560	33.33	59.62
Total Expenditures	2,181	389.89	367.05	3,400	424.69	523.36	4,038	458.35	700.59	6,619	550.66	680.82	560	718.03	827.27
Number of Tests	2,181	0.57	0.60	3,400	0.79	0.66	4,038	0.86	0.66	6,619	0.99	0.82	560	1.02	0.89
Number of Drugs	2,181	0.63	1.50	3,400	1.05	1.87	4,038	0.91	1.60	6,619	1.04	1.71	560	1.09	1.66
% Complications	2,181	0.34	0.47	3,400	0.39	0.49	4,038	0.28	0.45	6,619	0.32	0.47	560	0.39	0.49
% Non-Pegnancy Complications	2,181	0.18	0.38	3,400	0.22	0.42	4,038	0.23	0.42	6,619	0.27	0.45	560	0.29	0.46

Local Hospitals

	Pre-Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Laboratory Expenditures	1,552	313.48	476.57	2,527	312.69	489.33	2,937	320.26	562.36	3,950	404.67	634.30	306	553.86	737.20
Drug Expenditures	1,552	41.49	111.28	2,527	38.39	81.72	2,937	40.01	90.49	3,950	35.17	78.66	306	33.50	72.44
Total Expenditures	1,552	433.88	520.91	2,527	438.11	519.89	2,937	443.35	601.89	3,950	528.87	661.82	306	679.00	748.89
Number of Tests	1,552	1.04	0.98	2,527	0.99	1.07	2,937	0.94	0.87	3,950	1.16	0.90	306	1.23	1.01
Number of Drugs	1,552	0.93	1.71	2,527	0.89	1.63	2,937	0.83	1.54	3,950	0.79	1.42	306	0.76	1.58
% Complications	1,552	0.30	0.46	2,527	0.32	0.47	2,937	0.27	0.45	3,950	0.27	0.45	306	0.28	0.45
% Non-Pegnancy Complications	1,552	0.29	0.46	2,527	0.33	0.47	2,937	0.33	0.47	3,950	0.36	0.48	306	0.34	0.47

Regional Hospitals

	Pre-Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Laboratory Expenditures	772	320.75	484.61	1,315	318.55	483.53	1,533	340.35	532.53	2,449	364.43	629.22	243	506.65	649.54
Drug Expenditures	772	35.37	157.16	1,315	49.05	157.22	1,533	42.33	111.42	2,449	36.91	119.41	243	36.60	97.73
Total Expenditures	772	429.62	559.97	1,315	460.17	550.63	1,533	471.31	597.65	2,449	479.52	679.84	243	634.39	711.12
Number of Tests	772	1.12	1.43	1,315	1.10	1.33	1,533	1.05	1.50	2,449	1.20	1.05	243	1.39	1.57
Number of Drugs	772	0.47	1.20	1,315	0.55	1.26	1,533	0.56	1.23	2,449	0.53	1.18	243	0.50	1.15
% Complications	772	0.30	0.46	1,315	0.28	0.45	1,533	0.24	0.43	2,449	0.21	0.41	243	0.23	0.42
% Non-Pegnancy Complications	772	0.22	0.41	1,315	0.30	0.46	1,533	0.32	0.47	2,449	0.33	0.47	243	0.34	0.47

Medical Center

	Pre-Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Laboratory Expenditures	789	315.85	359.88	1,254	359.51	688.83	1,320	340.36	590.89	1,904	381.16	725.30	155	389.58	446.81
Drug Expenditures	789	28.95	107.27	1,254	42.87	159.62	1,320	50.45	183.09	1,904	57.76	233.85	155	31.34	97.70
Total Expenditures	789	415.37	401.15	1,254	494.16	757.49	1,320	485.96	689.31	1,904	529.40	816.94	155	529.37	498.91
Number of Tests	789	1.13	1.18	1,254	1.14	1.58	1,320	1.10	1.73	1,904	1.28	1.51	155	1.37	1.45
Number of Drugs	789	0.32	0.91	1,254	0.42	1.10	1,320	0.44	1.09	1,904	0.42	1.03	155	0.32	0.80
% Complications	789	0.46	0.50	1,254	0.42	0.49	1,320	0.30	0.46	1,904	0.31	0.46	155	0.35	0.48
% Non-Pegnancy Complications	789	0.17	0.38	1,254	0.27	0.45	1,320	0.31	0.46	1,904	0.37	0.48	155	0.42	0.50

All expenditures in New Taiwan Dollars, where $1 USD = $32 NTD

Table II: Summary Statistics

By Provider Type and Period for Inpatient Stays for Child Births in Taiwan, 1997-2004

Clinics

	Pre Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Lab Expenditures	104,374	422.20	587.63	137,965	995.10	504.00	147,221	931.69	494.93	221,513	877.98	552.50	16,649	868.37	704.83
Radiology Expenditures	104,374	3.68	53.71	137,965	2.50	42.23	147,221	0.38	20.34	221,513	0.64	15.21	16,649	1.35	22.09
Treatment Expenditures	104,374	1,598.39	3,172.03	137,965	3,035.79	5,321.89	147,221	3,022.02	1,302.64	221,513	2,997.09	1,239.07	16,649	2,975.96	1,213.71
Surgery Expenditures	104,374	3,427.31	5,034.74	137,965	8,085.05	3,020.32	147,221	8,287.74	3,071.70	221,513	8,184.12	2,956.57	16,649	8,234.27	2,717.24
Drug Expenditures	104,374	367.36	907.49	137,965	843.24	1,203.52	147,221	782.25	1,151.21	221,513	604.53	1,142.02	16,649	498.28	886.79
Total Expenditures	104,374	15,680.42	8,599.09	137,965	16,106.54	13,529.13	147,221	15,971.42	6,827.69	221,513	15,578.78	6,956.17	16,649	15,506.15	6,292.91
Caesarian	30,708	24,131.42	9,021.50	43,731	25,055.76	3,332.40	46,545	24,381.82	3,838.39	70,069	23,909.04	4,803.21	5,147	23,797.32	2,569.55
Natural birth	73,666	12,157.59	5,353.54	94,234	11,953.49	14,436.47	100,676	12,083.08	3,679.18	151,444	11,724.60	3,625.02	11,502	11,795.95	3,136.48
Length of Stay	104,374	2.90	1.86	137,965	3.04	2.18	147,221	3.08	2.37	221,513	3.14	2.12	16,649	3.26	2.14
% Visits Lab Expenditures > 0	104,374	0.44	0.50	137,965	1.00	0.07	147,221	1.00	0.07	221,513	1.00	0.06	16,649	1.00	0.03
% Visits Radiology Expenditures > 0	104,374	0.01	0.09	137,965	0.01	0.08	147,221	0.00	0.03	221,513	0.00	0.04	16,649	0.00	0.06
% Visits Treatment Expenditures > 0	104,374	0.45	0.50	137,965	0.98	0.15	147,221	0.99	0.12	221,513	0.99	0.12	16,649	0.99	0.11
% Visits Surgery Expenditures > 0	104,374	0.43	0.49	137,965	0.97	0.16	147,221	0.98	0.14	221,513	0.98	0.14	16,649	0.98	0.13
% Visits Caesarean	104,374	0.29	0.46	137,965	0.32	0.47	147,221	0.32	0.46	221,513	0.32	0.47	16,649	0.31	0.46
% Visits with complications	104,374	0.29	0.45	137,965	0.32	0.46	147,221	0.31	0.46	221,513	0.31	0.46	16,649	0.30	0.46
% Visits with Delivery Complications	104,374	0.09	0.29	137,965	0.10	0.29	147,221	0.10	0.30	221,513	0.10	0.30	16,649	0.10	0.30

Local Hospitals

	Pre Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Lab Expenditures	110,154	901.56	927.10	148,176	1,059.82	953.94	147,452	991.28	910.29	213,523	1,037.95	1,190.47	16,210	1,199.58	1,917.96
Radiology Expenditures	110,154	12.88	157.99	148,176	14.08	175.39	147,452	12.12	141.77	213,523	16.68	183.78	16,210	30.00	348.45
Treatment Expenditures	110,154	2,601.12	3,286.03	148,176	2,778.55	2,207.96	147,452	2,788.13	2,086.83	213,523	2,832.98	2,792.87	16,210	2,916.10	3,684.23
Surgery Expenditures	110,154	5,417.68	4,366.26	148,176	7,372.45	4,400.97	147,452	7,454.33	4,422.52	213,523	7,526.63	4,704.86	16,210	7,364.38	5,104.58
Drug Expenditures	110,154	1,044.58	1,655.39	148,176	1,111.39	1,747.47	147,452	1,011.42	1,604.50	213,523	871.20	1,925.66	16,210	853.87	2,755.44
Total Expenditures	110,154	16,266.34	10,896.60	148,176	17,660.13	11,705.84	147,452	17,567.66	11,620.32	213,523	18,555.69	15,744.69	16,210	19,990.97	23,037.40
Caesarian	31,329	27,725.37	5,106.66	41,994	28,543.61	4,786.41	40,924	28,009.22	4,402.01	58,197	28,159.97	4,096.29	4,100	28,442.61	6,238.17
Natural birth	78,825	11,711.94	9,090.16	106,182	13,355.82	10,806.76	106,528	13,556.41	11,022.16	155,326	14,957.19	16,940.45	12,110	17,129.56	25,785.12
Length of Stay	110,154	3.59	2.76	148,176	3.63	2.90	147,452	3.60	2.81	213,523	3.76	3.18	16,210	3.99	3.86
% Visits Lab Expenditures > 0	110,154	0.86	0.35	148,176	0.98	0.13	147,452	0.98	0.14	213,523	0.99	0.10	16,210	0.99	0.08
% Visits Radiology Expenditures > 0	110,154	0.03	0.16	148,176	0.03	0.17	147,452	0.03	0.17	213,523	0.04	0.19	16,210	0.05	0.22
% Visits Treatment Expenditures > 0	110,154	0.82	0.38	148,176	0.93	0.25	147,452	0.95	0.22	213,523	0.95	0.21	16,210	0.94	0.23
% Visits Surgery Expenditures > 0	110,154	0.76	0.43	148,176	0.88	0.33	147,452	0.89	0.31	213,523	0.89	0.31	16,210	0.87	0.34
% Visits Caesarean	110,154	0.28	0.45	148,176	0.28	0.45	147,452	0.28	0.45	213,523	0.27	0.45	16,210	0.25	0.43
% Visits with complications	110,154	0.40	0.49	148,176	0.41	0.49	147,452	0.39	0.49	213,523	0.39	0.49	16,210	0.42	0.49
% Visits with Delivery Complications	110,154	0.19	0.39	148,176	0.21	0.41	147,452	0.22	0.42	213,523	0.24	0.43	16,210	0.23	0.42

Regional Hospitals

	Pre Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Lab Expenditures	80,475	1,313.27	2,402.13	106,108	1,448.69	2,333.47	111,888	1,455.75	2,562.91	170,844	1,494.32	2,610.31	14,066	1,653.16	3,046.83
Radiology Expenditures	80,475	43.31	362.35	106,108	50.82	482.15	111,888	57.90	634.38	170,844	62.43	638.52	14,066	88.52	852.71
Treatment Expenditures	80,475	2,728.92	5,591.99	106,108	3,185.14	6,249.12	111,888	3,192.76	5,975.50	170,844	3,171.22	5,936.45	14,066	3,295.58	6,773.09
Surgery Expenditures	80,475	5,398.37	4,477.60	106,108	7,112.91	5,468.05	111,888	7,094.59	5,519.49	170,844	7,098.61	5,765.33	14,066	7,069.42	6,298.67
Drug Expenditures	80,475	1,329.39	3,718.30	106,108	1,499.84	4,290.49	111,888	1,496.46	4,408.33	170,844	1,213.63	4,216.07	14,066	1,179.94	4,282.34
Total Expenditures	80,475	18,928.51	28,685.17	106,108	21,387.16	32,391.72	111,888	21,496.22	32,224.92	170,844	22,758.18	36,074.17	14,066	24,790.35	43,664.66
Caesarian	19,564	29,351.76	6,373.67	26,155	30,271.15	6,463.62	28,177	30,030.52	8,759.58	42,781	30,168.08	10,758.06	3,300	30,302.56	6,313.49
Natural birth	60,911	15,580.67	32,062.12	79,953	18,480.95	36,667.81	83,711	18,623.59	36,460.86	128,063	20,282.81	40,901.68	10,766	23,100.74	49,665.73
Length of Stay	80,475	4.28	4.87	106,108	4.31	5.18	111,888	4.28	4.96	170,844	4.34	5.07	14,066	4.50	5.42
% Visits Lab Expenditures > 0	80,475	0.92	0.27	106,108	0.98	0.13	111,888	0.98	0.15	170,844	0.98	0.12	14,066	0.99	0.11
% Visits Radiology Expenditures > 0	80,475	0.07	0.25	106,108	0.08	0.27	111,888	0.08	0.27	170,844	0.09	0.28	14,066	0.10	0.29
% Visits Treatment Expenditures > 0	80,475	0.88	0.32	106,108	0.94	0.23	111,888	0.95	0.22	170,844	0.94	0.23	14,066	0.93	0.25
% Visits Surgery Expenditures > 0	80,475	0.75	0.43	106,108	0.81	0.39	111,888	0.81	0.39	170,844	0.81	0.39	14,066	0.79	0.41
% Visits Caesarean	80,475	0.24	0.43	106,108	0.25	0.43	111,888	0.25	0.43	170,844	0.25	0.43	14,066	0.23	0.42
% Visits with complications	80,475	0.42	0.49	106,108	0.43	0.50	111,888	0.44	0.50	170,844	0.43	0.49	14,066	0.45	0.50
% Visits with Delivery Complications	80,475	0.20	0.40	106,108	0.24	0.43	111,888	0.26	0.44	170,844	0.26	0.44	14,066	0.27	0.44

Medical Centers

	Pre Period			District Court			High Court			Supreme Court			Law Amendment		
Variable	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Lab Expenditures	57,883	1,980.87	4,173.00	75,461	2,111.69	4,551.82	78,403	2,009.36	3,924.13	113,698	2,111.66	4,219.96	9,344	2,483.07	5,292.27
Radiology Expenditures	57,883	94.47	851.86	75,461	101.51	1,026.92	78,403	106.28	972.03	113,698	129.71	1,177.51	9,344	197.66	1,341.74
Treatment Expenditures	57,883	3,474.71	8,093.23	75,461	3,737.38	9,348.77	78,403	3,657.05	8,370.48	113,698	3,683.81	8,966.63	9,344	4,131.17	11,950.85
Surgery Expenditures	57,883	5,755.11	4,794.36	75,461	7,185.78	6,250.65	78,403	7,198.20	6,439.54	113,698	7,166.44	7,033.38	9,344	6,964.40	8,488.85
Drug Expenditures	57,883	1,804.17	5,814.39	75,461	1,931.87	6,764.42	78,403	2,040.24	7,436.12	113,698	1,865.87	7,812.93	9,344	1,917.87	7,900.50
Total Expenditures	57,883	24,174.03	45,450.03	75,461	27,419.28	51,252.61	78,403	27,365.52	47,865.87	113,698	29,153.95	54,679.85	9,344	33,233.35	70,596.90
Caesarian	14,825	30,354.32	15,114.42	19,285	31,871.80	16,775.54	19,799	31,551.47	13,835.47	27,969	31,820.87	14,413.59	2,080	32,349.63	10,933.86
Natural birth	43,058	22,046.13	51,774.71	56,176	25,890.74	58,505.36	58,604	25,951.32	54,704.79	85,729	28,283.87	62,405.85	7,264	33,486.39	79,854.40
Length of Stay	57,883	4.91	6.02	75,461	5.09	6.60	78,403	5.16	6.52	113,698	5.24	6.79	9,344	5.58	7.63
% Visits Lab Expenditures > 0	57,883	0.94	0.23	75,461	0.99	0.11	78,403	0.99	0.11	113,698	0.99	0.10	9,344	0.99	0.10
% Visits Radiology Expenditures > 0	57,883	0.08	0.28	75,461	0.09	0.29	78,403	0.10	0.29	113,698	0.11	0.31	9,344	0.13	0.34
% Visits Treatment Expenditures > 0	57,883	0.91	0.28	75,461	0.95	0.22	78,403	0.95	0.22	113,698	0.94	0.23	9,344	0.93	0.26
% Visits Surgery Expenditures > 0	57,883	0.77	0.42	75,461	0.78	0.42	78,403	0.78	0.41	113,698	0.77	0.42	9,344	0.74	0.44
% Visits Caesarean	57,883	0.26	0.44	75,461	0.26	0.44	78,403	0.25	0.43	113,698	0.25	0.43	9,344	0.22	0.42
% Visits with complications	57,883	0.51	0.50	75,461	0.51	0.50	78,403	0.53	0.50	113,698	0.52	0.50	9,344	0.57	0.50
% Visits with Delivery Complications	57,883	0.23	0.42	75,461	0.22	0.41	78,403	0.24	0.43	113,698	0.23	0.42	9,344	0.22	0.42

All expenditures in New Taiwan Dollars, where $1 USD = $32 NTD

Table III: Provider Characteristics

	Clinics		Local Hospitals		Regional Hospitals		Medical Centers	
	Inpatient	Outpatient	Inpatient	Outpatient	Inpatient	Outpatient	Inpatient	Outpatient
Total Number of Providers	666	1322	428	249	69	65	15	15
Total Number of Doctors	893	1548	2,863	838	2,979	642	2,328	587
Average Number of Doctors/Provider	1.63	1.33	8.23	4.13	48.85	11.33	159.2	40
25% Percentile	1	1	1	2	25	6	83	22
50% Percentile	1	1	3	3	48	10	140	35
75% Percentile	2	1	10	5	65	15	225	48
99% Percentile	6	5	54	16	116	33	420	205
Percentage of Physician-Owners	62	69	7	10.8	0.4	0	0.025	0
Percentage of Private Providers	96	96.6	85	79.5	50	50.7	33	33.3

Numbers from a data set of pregnant women receiving inpatient and outpatient care, 1997-2004

Average number of doctors per provider reflect doctors providing care to pregnant women; these numbers are based on an eight-year span and may not reflect the average number of doctors at a given provider type at any moment

Table IV: Numbers of Laboratory Tests, Post-District Court

VARIABLE	(1) Number of Tests	(2) Number of Tests	(3) Number of Tests	(4) Number of Tests	(5) Number of Tests	(6) Number of Tests
Post × Owner	0.283***	0.282***	0.282***	0.211***	0.211***	0.210***
	(0.0427)	(0.0428)	(0.0429)	(0.0522)	(0.0523)	(0.0524)
Post × Local Hospital				0.0274	0.0297	0.0291
				(0.0687)	(0.0687)	(0.0688)
Post × Regional Hospital				0.0381	0.0369	0.0372
				(0.0746)	(0.0747)	(0.0747)
Post	-0.00168	-0.182***	-0.182***	-0.212***	-0.213***	-0.213***
	(0.0221)	(0.0390)	(0.0390)	(0.0662)	(0.0663)	(0.0663)
Owner	-0.222***	-0.227***	-0.228***	-0.193***	-0.193***	-0.190***
	(0.0629)	(0.0614)	(0.0633)	(0.0655)	(0.0677)	(0.0685)
Local Hospital				-0.0135	-0.0152	-0.0219
				(0.0862)	(0.0867)	(0.0880)
Regional Hospital				-0.0693	-0.0798	-0.0639
				(0.0884)	(0.0936)	(0.0969)
Patient Age	Y	Y	Y	Y	Y	Y
Complications	Y	Y	Y	Y	Y	Y
Nonpregnancy Complications	N	N	Y	N	Y	Y
Quarter Fixed Effects	N	Y	Y	Y	Y	Y
Region Fixed Effects	N	N	Y	N	N	Y
Constant	1.048***	1.222***	1.057***	1.257***	1.244***	1.096***
	(0.0347)	(0.0560)	(0.197)	(0.0800)	(0.0790)	(0.190)
Observations	7,770	7,770	7,770	7,770	7,770	7,770
R-squared	0.040	0.050	0.051	0.051	0.053	0.053
Number of panel_id	1,106	1,106	1,106	1,106	1,106	1,106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Claims data for pregnant women seeking outpatient care for antepartum examinations in Taiwan, 1997-1999

Methodology: OLS regression with physician fixed effects

Table V: Physician Orders Post-District Court Decision, Taipei and Kaohsiung

VARIABLES	(1) Number of Tests	(2) Number of Drugs
Post × Treated	0.762***	0.361
	(0.178)	(0.393)
Treated	Omitted	Omitted
Post	-0.149	-0.686
	(0.296)	(0.486)
Nonpregnancy Complications	Y	Y
Patient Age	Y	Y
Quarter Fixed Effects	Y	Y
Constant	0.666*	2.570***
	(0.382)	(0.729)
Observations	626	626
R-squared	0.112	0.058
Number of panel_id	120	120

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Methodology: OLS regression with physician fixed effects

Data: Claims data for pregnant women seeking outpatient care in Taipei (treated city) and Kaohsiung (control), 1997-1999

Table V.A: Likelihood of Specific Tests Ordered, Post-District Court

VARIABLES	(1) **Ultrasound**	(2) **Fetal Position**	(3) **Infection**	(4) **Fetal Test**	(5) **Lab Panel**
Post × Owner	0.00657	0.00783	0.0136	0.0144**	-0.00199
	(0.00553)	(0.00484)	(0.00832)	(0.00724)	(0.00943)
Post × Local Hospital	0.0145	-0.000588	-0.0105	0.0139	0.0252*
	(0.0111)	(0.00545)	(0.0138)	(0.0124)	(0.0137)
Post × Regional Hospital	0.0171	0.00329	0.0115	0.0204	0.0216
	(0.0120)	(0.0109)	(0.0156)	(0.0162)	(0.0247)
Post	-0.00166	0.00478	-0.0275	0.00312	-0.0266**
	(0.0127)	(0.00493)	(0.0173)	(0.0137)	(0.0133)
Owner	7.27e-05	-0.000896	-0.0163*	-0.000823	-0.0403
	(0.00531)	(0.00721)	(0.00963)	(0.00890)	(0.0304)
Local Hospital	-0.0114	-0.0128	0.00696	-0.0242	0.0535
	(0.00775)	(0.0204)	(0.0110)	(0.0218)	(0.0333)
Regional hospital	0.00226	-0.0214	0.0556*	-0.0191	0.283***
	(0.0113)	(0.0236)	(0.0301)	(0.0262)	(0.100)
Patient Age	Y	Y	Y	Y	Y
Complications	Y	Y	Y	Y	Y
Nonpregnancy Complications	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y
Regional Fixed Effects	Y	Y	Y	Y	Y
Constant	-0.00262	0.0129	0.0929	0.0103	-0.300**
	(0.0196)	(0.0269)	(0.0861)	(0.0332)	(0.130)
Observations	7,770	7,770	7,770	7,770	7,770
R-squared	0.004	0.010	0.005	0.006	0.042
Number of panel_id	1,106	1,106	1,106	1,106	1,106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Claims data for pregnant women seeking outpatient care for antepartum examinations in Taiwan, 1997-1999

Methodology: OLS regression with physician fixed effects

Table VI: Logged Inpatient Expenditures for Laboratory Tests, Treatments, and Surgical Procedures (Taipei and Kaohsiung Only)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	District Court			High Court			Supreme Court			Law Amendment		
VARIABLES (logged)	Laboratory	Treatment	Surgery	Laboratory	Treatment	Surgery	Laboratory	Treatment	Surgery	Laboratory	Treatment	Surgery
Post × Treated	-0.0707	-0.205	0.103	-0.0244	0.00717	-0.00666	-0.00339	-0.00473	-0.00884	-0.0150	0.0188	0.00279
	(0.0477)	(0.139)	(0.110)	(0.0706)	(0.0223)	(0.0133)	(0.0656)	(0.0222)	(0.0104)	(0.0214)	(0.0267)	(0.0140)
Treated	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted
Post	-0.0142	0.398	-0.228	0.0375	-0.00515	-0.00334	-0.0411**	-0.0258	-0.0143	0.000307	-0.00857	-0.000317
	(0.0626)	(0.330)	(0.308)	(0.0720)	(0.0544)	(0.0487)	(0.0179)	(0.0254)	(0.0109)	(0.0206)	(0.0254)	(0.0125)
Patient Age	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Delivery Complications	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Constant	6.762***	7.504***	9.015***	6.601***	7.763***	8.803***	6.408***	7.742***	8.822***	6.397***	7.713***	8.783***
	(0.0685)	(0.264)	(0.233)	(0.0460)	(0.0329)	(0.0231)	(0.0465)	(0.0287)	(0.0547)	(0.0650)	(0.0405)	(0.0287)
Observations	21,711	21,349	21,200	34,013	33,353	33,286	28,236	27,766	27,733	7,761	7,737	7,707
R-squared	0.053	0.113	0.099	0.056	0.082	0.088	0.046	0.095	0.114	0.052	0.107	0.148
Number of panel_id	67	67	67	77	77	77	74	74	74	56	56	56

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Inpatient claims for pregnant women seeking care for child deliveries or pregnancy-related complications, Taipei and Kaohsiung, 1997-2004

Methodology: OLS regression with physician fixed effects. All dependent variables logged to denote approximate percentage changes in expenditures.

Table VII: Likelihood of Physician Order for Laboratory Tests, Radiological Imaging, Treatments, and Surgical Procedures (Taipei and Kaohsiung Only)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	District Court				High Court				Supreme Court				Law Amendment			
VARIABLES (dummy)	**Laboratory**	**Radiology**	**Treatment**	**Surgery**	**Laboratory**	**Radiology**	**Treatment**	**Surgery**	**Laboratory**	**Radiology**	**Treatment**	**Surgery**	**Laboratory**	**Radiology**	**Treatment**	**Surgery**
Post × Treated	0.389***	0.0288	0.395***	0.398***	-0.00228	-0.000439	0.00613	0.00371	-0.000474	0.00417	-0.00690	-0.00634	-0.000191	-0.00609	-0.00500*	0.00136
	(0.111)	(0.0179)	(0.111)	(0.113)	(0.00204)	(0.000458)	(0.00434)	(0.00438)	(0.000410)	(0.00374)	(0.00458)	(0.00429)	(0.00124)	(0.00767)	(0.00271)	(0.00556)
Treated	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted
Post	0.528***	-0.00894	0.523***	0.519***	-0.00148	-0.00157**	0.0156***	0.00810	9.25e-05	-0.000717	0.00920***	0.00809*	0.00451	-0.00433	0.00700	0.00377
	(0.100)	(0.00662)	(0.101)	(0.100)	(0.00565)	(0.000661)	(0.00503)	(0.00954)	(9.19e-05)	(0.00102)	(0.00296)	(0.00467)	(0.00409)	(0.00538)	(0.00451)	(0.00659)
Patient Age	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Delivery Complications	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Constant	0.377***	0.0158**	0.369***	0.361***	0.916***	0.00175	0.964***	0.882***	0.999***	0.0160*	0.989***	0.990***	0.995***	0.0280	0.997***	0.990***
	(0.0636)	(0.00644)	(0.0634)	(0.0621)	(0.0383)	(0.00231)	(0.00560)	(0.0382)	(0.00194)	(0.00956)	(0.00777)	(0.00838)	(0.00658)	(0.0209)	(0.00188)	(0.00775)
Observations	26,578	26,578	26,578	26,578	158,405	158,405	158,405	158,405	28,242	28,242	28,242	28,242	7,768	7,768	7,768	7,768
R-squared	0.566	0.018	0.499	0.491	0.048	0.001	0.002	0.012	0.001	0.004	0.006	0.006	0.002	0.013	0.001	0.001
Number of panel_id	73	73	73	73	329	329	329	329	74	74	74	74	56	56	56	56

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Inpatient claims of pregnant women seeking care for child deliveries or pregnancy-related complications, Taipei and Kaohsiung, 1997-2004

Methodology: OLS regressions with physician fixed effects. All dependent variables are categorical, set to 1 if the expenditure is a positive sum.

Table VIII: Numbers of Drugs, Post-District Court Decision

VARIABLES	(1) Number of Drugs	(2) Number of Drugs	(3) Number of Drugs	(4) Number of Drugs	(5) Number of Drugs	(6) Number of Drugs
Post × Owner	-0.00999	-0.00969	-0.00862	-0.00239	0.00880	0.00786
	(0.0423)	(0.0421)	(0.0332)	(0.0598)	(0.0482)	(0.0483)
Post × Local Hospital				0.0467	0.0876*	0.0872*
				(0.0623)	(0.0475)	(0.0475)
Post × Regional Hospital				0.138*	0.107**	0.105**
				(0.0780)	(0.0523)	(0.0525)
Post	0.00873	-0.0413	-0.0622	-0.0994	-0.128*	-0.128*
	(0.0282)	(0.0859)	(0.0661)	(0.0910)	(0.0712)	(0.0712)
Owner	-0.149*	-0.147*	-0.0458	-0.0887	-0.00141	0.00792
	(0.0887)	(0.0885)	(0.0604)	(0.0773)	(0.0672)	(0.0666)
Local Hospital				-0.0420	-0.108	-0.0965
				(0.116)	(0.0959)	(0.0960)
Regional Hospital				0.243**	0.115	0.151**
				(0.116)	(0.0799)	(0.0744)
Patient Age	Y	Y	Y	Y	Y	Y
Complications	Y	Y	Y	Y	Y	Y
Nonpregnancy Complications	N	N	Y	N	Y	Y
Quarter Fixed Effects	N	Y	Y	Y	Y	Y
Regional Fixed Effects	N	N	Y	N	N	Y
Constant	0.188***	0.236**	0.255	0.190*	0.0865	0.0665
	(0.0535)	(0.111)	(0.184)	(0.110)	(0.0915)	(0.200)
Observations	7770	7770	7770	7770	7770	7770
R-squared	0.026	0.027	0.390	0.029	0.390	0.391
Number of panel_id	1106	1106	1106	1106	1106	1106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Claims data for pregnant women seeking outpatient care for antepartum examinations in Taiwan, 1997-1999

Methodology: OLS regression with physician fixed effects

Table IX: Number of Laboratory Tests, Following Subsequent Higher Court Decisions and Law Amendment

	(1) High Court	(2) Supreme Court	(3) Law Amendment
VARIABLES	Number of Tests	Number of Tests	Number of Tests
Post × Owner	-0.00735	-0.0143	-0.0677*
	(0.0437)	(0.0315)	(0.0361)
Post × Local Hospital	-0.0491	0.0178	0.0455
	(0.0514)	(0.0349)	(0.0394)
Post × Regional Hospital	-0.0273	0.0996**	0.0301
	(0.0426)	(0.0398)	(0.0383)
Post	0.0295	0.0866**	0.0180
	(0.0597)	(0.0380)	(0.0396)
Owner	0.00448	0.0519	0.0318
	(0.0306)	(0.0493)	(0.0619)
Local Hospital	0.00893	0.0289	0.0153
	(0.0341)	(0.0450)	(0.0510)
Regional Hospital	-0.127**	-0.0436	0.0262
	(0.0574)	(0.0566)	(0.0778)
Patient Age	Y	Y	Y
Complications	Y	Y	Y
Nonpregnancy Complications	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y
Regional Fixed Effects	Y	Y	Y
Constant	1.218***	1.058***	1.268***
	(0.188)	(0.115)	(0.165)
Observations	12229	16757	11971
R-squared	0.011	0.027	0.005
Number of panel_id	1372	1543	1436

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Claims data for pregnant women seeking outpatient care for antepartum examinations in Taiwan, 1999-2004

Methodology: OLS regression with physician fixed effects

Table IX.A: Likelihood of Specific Tests Ordered, Post-Law Amendment

VARIABLES	(1) **Ultrasound**	(2) **Fetal Position**	(3) **Infection**	(4) **Fetal Test**	(5) **Lab Panel**
Post × Owner	-0.00826	-0.00229	0.00327	-0.0240**	0.00139
	(0.00933)	(0.00553)	(0.0151)	(0.0108)	(0.0200)
Post × Local Hospital	-0.0168	0.0145	-0.000643	0.00945	-0.00836
	(0.0141)	(0.0106)	(0.0192)	(0.0179)	(0.0205)
Post × Regional Hospital	-0.0446***	0.00853	0.0109	3.97e-05	0.0273
	(0.0142)	(0.0100)	(0.0199)	(0.0225)	(0.0232)
Post	0.0190	0.00863	0.0128	0.0106	0.0177
	(0.0163)	(0.00994)	(0.0207)	(0.0205)	(0.0191)
Owner	-0.0110	0.00712	-0.0131	8.35e-05	-0.0402
	(0.00799)	(0.00663)	(0.0146)	(0.00976)	(0.0371)
Local Hospital	-0.0105	-0.00755	0.0284	-0.0190	0.0644*
	(0.0169)	(0.0130)	(0.0238)	(0.0229)	(0.0386)
Regional Hospital	0.0107	-0.0227	0.0527	-0.0255	0.188**
	(0.0225)	(0.0231)	(0.0371)	(0.0319)	(0.0766)
Patient Age	Y	Y	Y	Y	Y
Complications	Y	Y	Y	Y	Y
Nonpregnancy Complications	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y
Region Fixed Effects	Y	Y	Y	Y	Y
Constant	0.0839	0.00785	0.0698	0.0763	-0.237
	(0.0726)	(0.0228)	(0.0764)	(0.0643)	(0.185)
Observations	11971	11971	11971	11971	11971
R-squared	0.021	0.019	0.003	0.033	0.019
Number of panel_id	1436	1436	1436	1436	1436

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Data: Claims data for pregnant women seeking outpatient care for antepartum examinations in Taiwan, 2001-2004
Methodology: OLS regression with physician fixed effects

Table X: Likelihood of Caesarian Section and of Delivery Complications, Taipei and Kaohsiung

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	District Court		**High Court**		**Supreme Court**		**Law Amendment**	
VARIABLES	**Caesarean**	**Delivery Complications**	**Caesarean**	**Delivery Complications**	**Caesarean**	**Delivery Complications**	**Caesarean**	**Delivery Complications**
Post × Treated	-0.0254*	0.0385	0.00603	0.0137	-0.00884	-0.00520	0.0307	0.0357
	(0.0152)	(0.0245)	(0.00975)	(0.0180)	(0.00784)	(0.0252)	(0.0195)	(0.0357)
Treated	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted
Post	-0.00582	-0.0276	-0.0502*	0.0310	-0.000508	0.0141	-0.0121	0.00837
	(0.0113)	(0.0212)	(0.0294)	(0.0637)	(0.00783)	(0.0169)	(0.0105)	(0.0187)
Patient Age	Y	Y	Y	Y	Y	Y	Y	Y
Complications	Y	Y	Y	Y	Y	Y	Y	Y
Delivery Complications	Y	N	Y	N	Y	N	Y	N
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Constant	0.0192**	0.152***	0.0543*	0.151**	-0.0427	0.203***	-0.0197	0.145***
	(0.00775)	(0.0210)	(0.0313)	(0.0608)	(0.0324)	(0.0603)	(0.0148)	(0.0334)
Observations	25,405	25,405	32,399	32,399	27,024	27,024	7,445	11,150
R-squared	0.873	0.103	0.872	0.129	0.877	0.156	0.88	0.19
Number of panel_id	71	71	75	75	71	71	54	59

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data:Inpatient claims data for pregnant women giving birth in Taipei and Kaohsiung, 1997-2004

Methodology: OLS regressions with physician fixed effects. Dependent variables are (1) a caesarean dummy, and (2) a delivery complications dummy set to 1 if patient's diagnosis codes have any one of ICD9CM codes 660-669 (complications occurring mainly in the course of labor and delivery).

Table XI: Likelihood of Caesarian Section and of Delivery Complications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	District Court		High Court		Supreme Court		Law Amendment	
VARIABLES	Caesarean	Delivery Complications	Caesarean	Delivery Complications	Caesarean	Delivery Complications	Caesarean	Delivery Complications
Post × Owner	-0.00781	-0.0136**	0.00230	0.00360	-0.00841**	0.00347	0.0234***	0
	(0.00792)	(0.00656)	(0.00442)	(0.00494)	(0.00384)	(0.00410)	(0.00586)	(0.00532)
Post × Local Hospital	-0.0242***	-0.0182***	0.00858*	0.00806	-0.0148***	0.0107**	0.00824	-0.00845
	(0.00761)	(0.00594)	(0.00483)	(0.00505)	(0.00387)	(0.00434)	(0.00676)	(0.00611)
Post × Regional Hospital	-0.0177*	-0.0159**	-0.000887	-0.00132	-0.00612	0.00386	0.00108	0.00131
	(0.00910)	(0.00698)	(0.00701)	(0.00560)	(0.00462)	(0.00502)	(0.00775)	(0.00675)
Post	0.0200***	0.00688	-0.00666	0.00157	0.00803**	-0.0104**	-0.00494	0.000524
	(0.00698)	(0.00547)	(0.0125)	(0.0135)	(0.00404)	(0.00424)	(0.00578)	(0.00532)
Owner	0.0373	0.0197	0.0451**	0.0187	0.0602***	0.0320**	-0.00916	0.00737
	(0.0268)	(0.0167)	(0.0177)	(0.0165)	(0.0213)	(0.0155)	(0.00983)	(0.0114)
Local Hospital	-0.0243	-0.0163	-0.0123	0.00310	0.0222	0.0293**	-0.0293**	0.00709
	(0.0250)	(0.0164)	(0.0162)	(0.0137)	(0.0261)	(0.0133)	(0.0128)	(0.0133)
Regional Hospital	-0.0882***	-0.0519***	-0.0362	-0.000697	-0.0454*	-0.0152	-0.0695***	-0.0403**
	(0.0286)	(0.0143)	(0.0223)	(0.0141)	(0.0232)	(0.0187)	(0.0213)	(0.0167)
Patient Age	Y	Y	Y	Y	Y	Y	Y	Y
Delivery Complications	Y	N	Y	N	Y	N	Y	N
Complications	Y	Y	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Regional Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Constant	-0.0534*	0.00745	-0.134***	0.0913***	-0.153***	0.0922***	-0.206***	0.0325**
	(0.0294)	(0.0218)	(0.0277)	(0.0139)	(0.0251)	(0.0150)	(0.0202)	(0.0153)
Observations	711,113	711,113	509,843	836,779	722,941	722,941	370,756	370,756
R-squared	0.593	0.259	0.589	0.154	0.582	0.165	0.57	0.166
Number of panel_id	2,052	2,052	1,870	2,119	2,055	2,055	1,769	1,769

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data:Inpatient claims data for pregnant women giving birth, 1997-2004

Methodology: OLS regressions with physician fixed effects. Dependent variables are (1) a caesarean dummy, and (2) a delivery complications dummy set to 1 if patient's diagnosis codes have any one of ICD9CM codes 660-669 (complications occurring mainly in the course of labor and delivery).

Table XII: Test of Pre-Existing Trends in Test-Ordering Behavior of Physician-Owners before District Court Decision and Law Amendment

VARIABLES	(1) Number of Tests	(2) Number of Tests
Owner × 1997q2	-0.365*	
	(0.196)	
Owner × 1997q3	-0.316	
	(0.197)	
Owner × 1997q4	-0.256	
	(0.195)	
Owner × 1998q1	-0.187	
	(0.199)	
Owner × 1998q2	-0.0847	
	(0.218)	
Owner × 2001q3		-0.00241
		(0.0933)
Owner × 2001q4		0.0810
		(0.0863)
Owner × 2002q1		0.109
		(0.0898)
Owner × 2002q2		0.0623
		(0.0794)
Owner × 2002q3		0.0356
		(0.0864)
Owner × 2002q4		0.0788
		(0.0817)
Owner × 2003q1		0.141
		(0.0952)
Owner × 2003q2		0.138
		(0.0891)
Owner × 2003q3		0.0633
		(0.0906)
Owner × 2003q4		0.0789
		(0.0933)
Owner × 2004q1		0.126
		(0.0919)
Constant	-1.400***	1.553***
	(0.198)	(0.513)
Observations	5,763	16,435
R-squared	0.019	0.007
Number of panel_id	1,303	2,014

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Methodology: OLS with physician fixed effects. Dependent variable (number of tests) regressed on patient age, owner dummy, complications dummy, quarter dummies and the interaction of owner and quarter dummies. Only interaction terms reported. Test is intended to demonstrate whether there were pre-existing trends before legal opinion and law change.

Data: Claims data for pregnant women seeking outpatient care in (1) 1997-1998, and (2) 2001-2004

Table XIII: Falsification Tests for Likelihood of Caesarean and Positive Expenditures, Taipei and Kaohsiung Only

	(1)	(2)	(3)	(4)	(5)	(6)
	Likelihood of C-Section		**Likelihood of Positive Expenditures**			
VARIABLES	**Caesarean**	**Delivery Complications**	**Laboratory**	**Radiology**	**Treatment**	**Surgery**
Post × Treated	-0.00656	-0.0169	-0.0448	-0.0326	-0.0278	-0.0298
	(0.0164)	(0.0212)	(0.105)	(0.0247)	(0.104)	(0.102)
Treated	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted
Post	0.0122	-0.0628	0.0644	-0.00123	0.0668	0.0652
	(0.0336)	(0.0807)	(0.0440)	(0.00670)	(0.0430)	(0.0438)
Patient Age	Y	Y	Y	Y	Y	Y
Complications	Y	Y	Y	Y	Y	Y
Delivery Complications	Y	N	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Constant	0.0345**	0.163***	0.345***	0.0161*	0.339***	0.325***
	(0.0156)	(0.0188)	(0.0366)	(0.00842)	(0.0360)	(0.0384)
Observations	9,426	9,426	9,728	9,728	9,728	9,728
R-squared	0.873	0.094	0.342	0.013	0.338	0.314
Number of panel_id	57	57	57	57	57	57

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Data: Inpatient claims of pregnant women seeking care for child deliveries or pregnancy-related complications in Taipei and Kaoshiung, January to December, 1997

Methodology: OLS regressions with physician fixed effects. A random date pre-district court ruling of June 30, 1997 was selected as a fictitious treatment date. Treatment city is Taipei; Control city is Kaohsiung