

# The Impact of Malpractice Litigation on Physician Behavior: The Case of Childbirth\*

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## Abstract

How do malpractice lawsuits affect physician behavior? Despite the central importance of this question in understanding the design of malpractice law, empirical evidence on this question remains limited. In this paper, I study the impact of malpractice claims against obstetricians, a specialty that is regarded as particularly subject to malpractice concerns, on their choice of whether to perform C-sections, a common procedure that is thought to be sensitive to physician incentives. I find that immediately after an adverse event (defined as an obstetrical procedure that ultimately leads to a malpractice claim), C-section rates jump discontinuously by 4%. The increase in C-section rates persists even 4.5 years after the adverse event. Several other findings provide support to the view that fear of litigation and damage to reputation explain the results, rather than a mere response to the negative outcome that brought about the malpractice claim. First, unsuccessful claims, which, at the time of the adverse event, are perceived as less harmful to physicians' reputation, do not lead to an increase in C-section rates. Second, the impact on C-section rates is larger for patients insured by a commercial insurance provider, for which reputational concerns are likely to be stronger, since they are less constrained in their choice of physicians. In addition, the impact is smaller for experienced physicians, but not for those with a prior history of litigation claims. I also find evidence of peer effects: following an adverse event, a physician's colleagues also have higher C-section rates. Overall, this study shows that following an adverse event physicians adopt more conservative and costly treatment strategies and that their response is likely to be related to fear of litigation and damage to reputation.

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# 1 Introduction

Medical malpractice liability law has attracted much attention in the past decades. It is often argued that fear of lawsuits might encourage the provision of high-cost, low-benefit medical treatment, i.e. defensive medicine. This view is supported by evidence from self-reported data: studies that survey physicians, consistently find that physicians report practicing defensive medicine both by accepting fewer high-risk patients, and by choosing more conservative procedures and more diagnostic tests (Studdert et al. (2005), Kessler and McClellan (1997), Reyes (2010)). Nevertheless, despite the high stakes attributed to the design of optimal medical malpractice law, very little is known about the extent to which medical malpractice law affects healthcare providers' behavior, and the mechanisms underlying this effect.

In particular, it is not well-understood why physicians' choice of procedures would be strongly affected by medical malpractice law. Physicians are typically insured against malpractice litigation, and furthermore, physicians' premiums are not experience-rated and are typically set at the specialty level (Sloan (1990), Fournier and McInnes (2001)). Thus, since physicians do not bear the financial costs of medical malpractice litigation it is a puzzle: why do physicians care so deeply about medical malpractice litigation?

One hypothesis, linking medical malpractice litigation and medical treatment is that medical malpractice litigation might harm a physician's reputation. The various stages of the litigation process, from the initial investigation by the plaintiff, through the lawsuit and to the final payment, are visible to hospitals, colleagues, patients and lawyers, thereby magnifying the reputational consequences of incidents which result in litigation.

Motivated by that hypothesis, this study concentrates on the effect of physicians' personal exposure to malpractice lawsuits. It examines the effect of an *adverse event*, defined as an obstetrical procedure that ultimately leads to a malpractice claim, on treatment patterns of obstetricians, that are regarded as particularly sensitive to malpractice concerns (Reyes

(2010)). Particular attention is paid to an adverse event, rather than later stages in the litigation process, since physicians are likely to worry about the damage to their reputation from an impending law suit, and alter their behavior accordingly - immediately after an adverse event.

Physician's responses are studied by examining their decision to perform C-sections, a common procedure that is thought to be sensitive to physician incentives (see Currie and MacLeod (2008)), and that is often argued to be associated with the practice of defensive medicine. Inpatient data from Florida, matched with data on physicians' educational background and malpractice claim history is used to conduct the analysis.

This study extends the existing literature in two ways. First, it stresses physicians' responses immediately following an adverse event, which has not been rigorously studied before. Second, it investigates the mechanisms in the impact of an adverse event on treatment, by analyzing the heterogeneity in the response across physicians, patients and types of claims, and examining the causal role of fear of litigation in the response.

To evaluate the short-run response of physicians, I use a regression discontinuity design, estimating the "break" in C-section rates immediately after an adverse event. In order to estimate the long-run effect of an adverse event, I take two approaches, each based on a different identification assumption. The first is a matching method, pairing each affected physician with an individually-tailored control group. The second is an event study regression, estimating the response to an adverse event by controlling for physician and time fixed effects, as well as other covariates.

The empirical analysis yields the following main findings. First, following an adverse event there is a clear discontinuous jump in C-section rates of about 1 percentage point, which reflects an increase of roughly 4% in C-section rates. Second, the increase in C-section rates is persistent, lasting at least 4.5 years after the adverse event. Finally, I find evidence that physicians' close peers are also more likely to perform C-sections following the adverse event.

While fear of litigation and damage to reputation can explain an immediate response to the adverse event, physicians may also respond to the negative outcome that brought about the malpractice claim. Therefore, I investigate the causal role of fear of litigation and damage to reputation in the effect of an adverse event, by analyzing heterogeneity in the response across patients, physicians and claim-types. I find that the response to an adverse event is concentrated among successful claims, which, at the time of the adverse event, are more likely to be perceived as harmful to physicians' reputation than unsuccessful claims. Since the severity of outcomes in the two types of claims is similar, this result supports the causal role of malpractice litigation. Moreover, privately insured patients who are likely to be both less constrained in their ability to choose a prenatal physician and in their access to the legal system, are subject to a greater increase in C-sections following an adverse event than patients insured by Medicaid, providing additional support to the causal role of malpractice litigation.

The observed increase in C-section rates following adverse events is concentrated among less experienced physicians. However, physicians' responses are not significantly different between physicians with and without prior malpractice claim histories. Since a response to negative outcomes is expected to wane with prior adverse event exposure, whereas fear of harm to reputation is likely to increase with prior adverse event exposure, the latter result further supports the role of litigation in physicians' response to the adverse event. Overall, the results suggest that reputation and fear of litigation are important in physicians' response to the adverse event. It is important to note that the results do not rule out the effect of physicians' response to the negative outcome that is associated with an adverse event.

A major concern about the interpretation of the results as reflecting a change in practice patterns is that there might be a change in patient composition following the adverse event. I address this concern by testing for observed differences in the number of births, risk level of the mothers pool, mothers' mean age and the share of mothers insured by a private carrier around the adverse event. I find no evidence of a change in the characteristics of mothers

following the event, which alleviates those concerns.

The remainder of the paper is organized as follows. Section 2 describes previous work on medical malpractice litigation and healthcare provision. Section 3 presents the data, section 4 presents evidence on physicians' response to an adverse event, section 5 presents evidence on physicians' response to the first contact regarding a claim, section 6 presents evidence on peer effects and section 7 offers concluding remarks.

## **2 Background on Medical Malpractice and Related Work**

A growing body of empirical work attempts to evaluate the relationship between the threat of a lawsuit (“malpractice pressure”), and delivery of healthcare using a variety of identification approaches. In the case of elderly patients, in a seminal paper, Kessler and McClellan (1996), find that while tort reforms have no significant effect on health outcomes they significantly reduce medical costs (Sloan and Shadle (2009), reassessed those results and found that tort reforms do not significantly affect medical decisions). Baicker et al. (2007) find that higher malpractice awards and premiums are associated with higher Medicare spending. In the area of childbirth, Currie and MacLeod (2008) show that Joint and Several Liability reforms reduce complications of labor and procedure use, whereas caps on noneconomic damages increase them. Kim (2007) on the other hand, using variation in claim numbers in other specialties, finds that obstetricians' procedure choice is insensitive to malpractice pressure. In a recent working paper, Lakdawalla and Seabury (2009) exploit variation in the generosity of local juries to identify the causal impact of medical malpractice litigation on medical costs and mortality, and find that Liability Pressure is associated with improved outcomes, namely reductions in patient mortality.

This paper builds on and is directly related to several recent papers which study the association between healthcare and personal experience of malpractice litigation, using in-patient data from Florida, matched with physician history of malpractice claim data. Grant

and McInnes (2004) relate the change in Florida obstetricians' propensity to perform C-sections between 1992 and 1995 to their malpractice experience in 1993 and 1994. They find that claims which ultimately resulted in a large indemnity payment were associated with an increase in C-section rates and by contrast claims which ultimately resulted in a small indemnity payment were associated with a decrease in C-section rates, with overall small effect on C-section rates. Gimm (2010) uses, inpatient data from 1992-2000 aggregated in physician-year cells and does not find statistically significant evidence that physicians changed their practice patterns by increasing C-section rates in response to malpractice claims. Recently, Dranove and Watanabe (2010) examine whether physicians change C-section rates after the first contact regarding a lawsuit. They find that during the quarter of contact there is a hospital wide increase in C-section rates of 0.5 percentage points. In addition, they find that three quarters after the first contact physicians increase C-section rates by 1.3 percentage points for a period of 1 quarter. Overall their results imply small, short-lived increases in C-section rates after a physician contacted about a malpractice claim for the first time.

### **3 Data**

I use the universe of all births recorded in the Florida Hospital Inpatient Discharge Data ("inpatient data") spanning the years 1992-2008. Physicians who performed less than 25 deliveries throughout the entire period are excluded from the analysis, leaving about three million births performed by 2,307 physicians, which comprise 99.8% of all births. The inpatient data was merged with the Practitioner Profile Data File ("profile data"). The profile data contains detailed information about physicians' education history, allowing to create a measure of physicians' experience. Next, Medical Professional Liability Files ("claims data") for the years 1979-2008 were matched to the data. The claims data was matched using both license number and physician name. The claims data contains a history of closed medical malpractice claims, payments made if any, severity of injury, as well as the dates of injury,

report and closing of malpractice claims.

I then create an *adverse event panel*: a five year balanced panel, including physicians who appear in the data 10 quarters pre and post the adverse event. The first adverse event that is covered by the inpatient data period is chosen for each physician. A panel for the time of the first contact regarding a claim, a *first contact panel*, was created in an analogous way.

Figure 1 plots C-section rates in Florida for the years 1992-2008. The figure shows, consistent with the national trend (MacDorman et al. (2008)), that C-section rates have increased substantially from roughly 23% in 1996 to 38% in 2008. Table 1 provides summary statistics for three groups: the full sample, the adverse event panel and the first contact panel. Patient characteristics in the full sample are very similar to those in the two panels. Notably, in the panel samples there are lower rates of mothers under Medicaid, lower rates of Afro-American and Hispanic mothers, and lower incidence of risk factors.

Figure 2(a) presents the distribution of physicians' prior claims history, indicating that roughly 55% of the 459 physicians in the adverse event panel, did not have prior history of malpractice litigation at the time of the adverse event, and approximately 90% of the physicians experienced no more than four claims. Figure 2(b) shows a very similar distribution for the first contact panel. Figure 3(a)-(b) summarize the distribution of nominal payments per claim rounded to the closest multiple of \$50,000, in the adverse event and first contact panels, respectively. While roughly 31% of the claims, in the adverse event panel, are unsuccessful and result in a payment of zero (The first bar in Figure 3(a) shows a frequency of about 37% since it includes claims which resulted in low payments), there are claims with payments of about \$1,000,000 or more. Interestingly, Payment amounts tend to "bunch" around \$250,000 and \$500,000, which are standard per claim ceilings of physicians' premiums, suggesting that parties tend to reach a settlement based on the physicians' coverage.

## 4 The Effect of an Adverse Event

In order to analyze the effect of an adverse event, the timing of an adverse event was normalized to zero for all physicians, and other quarters were defined relative to this base period. I study the short-run effect of an adverse event by estimating the “break” in C-section rates immediately before and after the adverse event using a regression discontinuity design type estimation. The identification of the short-run effect is based on assuming that the difference between physician’s treatment behavior immediately before and after the adverse event is the result of the adverse event. However, using this approach one can not evaluate physicians’ response away from the discontinuity around the adverse event. In order to study the long-run effect of an adverse event, two approaches are used, each based on a different identification assumption. The first is a matching method, pairing each affected physician with an individually-tailored control group. The second is an event study approach, controlling for physician and time fixed effects, as well as other covariates.

### 4.1 Selection Around an Adverse Event

One might be concerned that the estimates of the effect of the adverse event reflect a change in the composition of the sample following the adverse event. Hence, it is important to check whether following the adverse event there was a change in the composition of the sample’s observable characteristics which are likely to be associated with a change in C-section rates. To address this matter I first plot the number of births around the adverse event to examine if it indicates a change in the per period sample size. Figure 4(a) plots per period birth numbers, showing no apparent change in the sample size around the adverse event. Next, I define high-risk deliveries: deliveries with one of a set of risk-factors and delivery complications, markedly breech position, previous C-section, hemorrhage, hypertension, multiple gestation

and oligohydramnios<sup>1</sup> (see a similar classification in MacDorman et al. (2008)). Figure 4(b) plots the per period share of high-risk mothers in the adverse event Panel. While there is a downward trend in the share of high-risk mothers in the sample, there is no visible discrete change in the share of high-risk mothers following the adverse event, indicating that risk levels are similar for mothers just before and after the adverse event. As an additional check, the per-period average mothers' age in the sample is plotted in Figure 4(c). This figure shows an upward trend in the average age of mothers over time, but there is no evidence of a discontinuity in mother's average age in the period following the adverse event, offering additional evidence that no change in the risk composition of the sample took place following the adverse event. Figure 4(d) plots per period rate of privately insured mothers, showing a small and statistically insignificant increase after the adverse event. To quantify the graphical evidence, columns (1)-(6) of Table 2 report, the estimates of a model analogous to (1), replacing C-section rates by high-risk, age and rate of mothers under private insurance, respectively. The estimates are consistent with the figures with very small and statistically insignificant coefficients.

Finally, to combine the three measures of selection, a linear probability model, estimating the effect of age, each of the high-risk factors and insurance type, on the probability of undergoing a C-section in the pre-event period is used. The average predicted C-section rates using the model's estimates for the entire panel are plotted in Figure 5. The Figure shows that predicted C-section rates decrease over time. There is an increase in C-section rates of roughly 0.3 percentage points following the adverse event, but as Table 3 shows, it is not statistically significant.

## 4.2 Short-Run Effect on an Adverse Event

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<sup>1</sup>High-risk includes the following diagnoses: Previous C-section, breech position, multiple gestation, hypertension, early onset, hemorrhage, obesity, diabetes, polyhydramnios, oligohydramnios & distress.

The discontinuity in C-section rates is estimated using a regression discontinuity design type model. The estimation equation has the form:

$$C\text{-section}_{it} = \alpha + \tau D + \beta_1 time + \beta_2 time^2 + \beta_3 time \cdot D + \beta_4 time^2 \cdot D + \varepsilon_{it} \quad (1)$$

where  $time \in \{-10, \dots -1, 0, \dots 9\}$  is the number of elapsed quarters since the adverse event and  $D \in \{0, 1\}$  is a dummy variable that indicates the post event periods so that  $D = 1$  if  $time \geq 0$ , and  $D = 0$  if  $time < 0$ .  $\tau$  is the coefficient of interest in this specification as it captures the effect of the adverse event on physician behavior. To test the robustness of the results, I control for confounding factors by estimating two additional specifications: basic controls, adds a set of patient characteristics - age, race and risk factors (including mother's previous C-section history, breech position and hypertension<sup>2</sup>). Full controls, adds, in addition to the basic controls, physician and quarter fixed effects.

*Results.* Figure 6 plots average per period C-section rates 10 periods prior to, and 10 periods following the adverse event. For visual reference, a quadratic regression model fit is added separately to the periods before and after the adverse event. Figure 6 shows an apparent jump of about 1 percentage point immediately following the adverse event, implying an increase of roughly 4% in C-section rates. Note that mean C-section rates away from the adverse event are quite smooth, confirming that absent the adverse event, C-section rates are not likely to change discontinuously. Column (1) of Table 4, displays the estimation results of equation (1). The estimates support the graphical evidence conveyed in Figure 6, indicating a statistically significant increase of 1.1 percentage points in C-section rates following the adverse event. columns (2) and (3) of Table 4 report the estimates of the basic and full controls models, showing a statistically significant increase in C-section rates of 0.9 and 0.76 percentage points respectively.

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<sup>2</sup>The full list of coefficients includes: previous C-section, breech position, multiple gestation, hypertension, early onset, hemorrhage, obesity, diabetes, polyhydramnios, oligohydramnios, anemia, distress and feto.

## 4.3 Long-Run Effect of an Adverse Event

### 4.3.1 A Matching Approach

In order to evaluate the long-run effects of malpractice litigation I employ a complementary approach based on a comparison between the treated physician group and a control groups. The time span of the panel is expanded to seven years, 10 quarters prior the adverse event and 18 quarters after the adverse event, leaving a smaller sample of 338 physicians. I create a control group by matching each physician with colleagues who appear in the data throughout the relevant 7 years. In order to generate a control group which best controls for the factors affecting C-section rates of the treated physician, one would prefer to choose physicians that are as close as possible to the treated physician. On the other hand, there is a concern that the adverse event affects the physician's close peers (an issue which is studied below). With this trade-off in mind, the control group that was chosen for the analysis is the set of physicians who treat patients from the same county as the treated physicians, excluding physicians who work at the same hospital as the treated physician<sup>3</sup>.

Using the control group, I construct an estimator for the difference in C-section rates between the treatment and control groups. To make the visual representation clearer, the results are summarized in six-months periods.

Formally, for individual physician  $i$ ,  $i = 1, \dots, N$ , in six-month period  $t$ ,  $t \in \{-5, \dots - 1, 0, \dots 8\}$

$$\tau_t = \frac{1}{N} \sum_{i=1}^N \{C-section_{it} - \frac{1}{J} \sum_1^J C-section_{jt}\} \quad (2)$$

where  $j \in \{1 \dots J\}$  is the set of physicians in the control group.

*Results.* Figure 7(a) plots average C-section rates five six-months periods before and

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<sup>3</sup>Same county is defined as the county in which most of a physicians' patients reside and same hospital is defined as the hospital in which most of a physician's deliveries are performed

nine six-months periods after the adverse event for all 338 physicians who are included in the seven years panel, and for the control group. For visual reference, a quadratic regression model fit is added separately to the periods before and after the adverse event for the control and treatment groups. The figure shows that prior to the adverse event, physicians in the treatment group tend to perform less C-sections relative to the average C-section rate in their county. This result is not surprising because, as Table 1 shows, the mother population in the panel tends to be of a higher socioeconomic status with lower incidence of risk factors. Following the event, there is a jump in C-section rates of the treated physicians and the gap between the groups narrows from about 1% to less than 0.5%. The dashed black vertical line indicates that two years have past since the adverse event, representing the approximate end of the Statute of Limitation period, after which, about 95% of the treated physicians were contacted and notified that they face a medical malpractice lawsuit. After the end of the first two years following the adverse event, the average rate of the treated physicians is growing closer the county average and four years after the adverse event, they are about equal.

In order to estimate the long-run effects of the medical malpractice litigation process, I estimate the average difference between the treatment and the control group for the five six-months periods prior to the adverse event, and for the five six-months periods starting after the end of two years following an adverse event. The results are summarized in column (1) of Table 5. In the period prior to the adverse event there is a statistically significant gap of 1 percentage point between average C-section rate of the treated physicians and average county C-section rate. In the 5 six-months period starting two years after the adverse event there is a very small and statistically insignificant gap between average C-section rate of the treated physicians and average county C-section rate.

In order to make inference based on the estimation result using this method, one must assume that the treatment and control group would have followed a similar trend in C-section rates if it weren't for the adverse event. However, it is apparent from Figure 7(a) that the

pre treatment C-section rates of the physicians who experience a lawsuit are lower than those of the control group, suggesting that this assumption may not hold. To address this concern, I restrict the control group to include only physicians who have similar experience, defined as a maximum 3 year gap from the treated physician, and physicians who use similar practice patterns, defined as less than 10 percentage point gap in average C-section rate in the pre adverse event period. This restriction leaves 251 physicians for whom there is a control group. The results of this refinement are summarized in Figure 7(b) and column (2) of Table 5. Figure 7(b) shows that prior to the adverse event, C-section rates for physicians in the treatment and the control group are quite similar. Following the adverse event, there is a jump in C-section rates of the treated physicians, and 4 years after the adverse event, C-section rates of the treatment group are roughly 2 percentage points higher than those of the control group. Column (2) of Table 5 confirms the visual impression, showing very small insignificant difference in C-section rates prior to the adverse event and a statistically significant difference of 1.7 percentage points between the treatment and control group, in the 5 six-months period after the end of two years following an adverse event. These estimates support the preceding analysis suggesting a long-run increase in C-section rates of roughly 1.5 percentage point.

### 4.3.2 An Event Study Approach

The second strategy I am taking in order to evaluate the long-run effect of an adverse event is an event study approach. The main estimation equation is

$$C\text{-}section_{jit} = \alpha + \delta_k time_{it}^k + \beta_1 physician_i + \beta_2 quarter_t + \beta_3 Char_{jit} + \varepsilon_{jit} \quad (3)$$

In (3) , *physician* is a vector of physician dummies, *quarter* is a vector of quarter dummies and *Char* is a vector of mother personal characteristics. The variables of interest are the event time indicator variables, *time*, a vector of dummies for the number of elapsed quarters

since the adverse event,  $k \in \{-10, \dots - 1, 0, \dots 9\}$ . The indicator variable  $time_{it}^k = 1$  if a physician  $i$  experienced an adverse event in quarter  $t - k$ . For example,  $time_{5,1995Q3}^0 = 1$ , if physician 5 experienced an adverse event in the third quarter of 1995. Using this specification,  $\delta_k$  is the effect of an adverse event  $k$  period following its occurrence.

*Results.* Figure 8 plots the estimates of  $\delta_k$  in equation (3). The thin vertical lines report the 95% confidence interval of the estimates. Columns (1) and (2) of Table 6 report the estimates and standard errors of the baseline specification, including physician quarter fixed effect, and of the full controls specification, adding mother characteristics, respectively. Figure 8 shows that before the adverse event the estimates of  $\delta_k$  are not statistically different from zero. Immediately following the adverse event there is a jump of roughly 1 percentage point in C-section rates. C-section rates continue to increase and the estimate of  $\delta_9$ , which estimates the effect of the adverse event on C-section rates 2.5 years following the adverse event, is roughly 2.5 percentage points.

#### 4.4 The Causal Role of Litigation

While fear of damage to reputation, amplified by an impending law suit may explain physicians' response to the adverse event, another interpretation of the results might be that the increase in C-section rates after the adverse event is a response to the negative outcome that brought about the malpractice claim (e.g. an emotional response which changes treatment patterns, see Redinbaugh et al. (2003)). I use the heterogeneity in the data to compare the short-run response to the adverse event in subsets of claim types, patients and physicians, in order to examine if the response is caused, at least in part, by fear of harm to reputation, amplified by the impending lawsuit.

*Which type of claims do physicians respond more to?* I exploit the fact that while 69% of the claims in the adverse event panel were successful and resulted in a positive payment (paid claims), 31% of the claims were unsuccessful, and ultimately resulted in zero payment (non-

paid claims). Under the assumption that immediately after the adverse event, physicians can predict whether a lawsuit is expected or not, claims that are unsuccessful ex-post, are less likely to be perceived as harmful for reputation ex-ante. Consequently, if the fear of litigation is responsible for the increase in C-section rates, a weaker response is expected among physicians who experienced an unsuccessful claim. A comparison between the severity of adverse outcomes of successful and unsuccessful claims shows that they are quite similar (e.g. in both groups the proportion of deaths is roughly 24%), therefore, if physicians respond only to the negative outcome that brought about the claim, one would expect a similar response in successful and unsuccessful claims.

Figures 9(a)-(b) display average per period C-section rates, among paid and non-paid claims respectively. Figure 9(a) shows that for paid claims, following the adverse event, there is a discernible jump of roughly 1.5 percentage points, implying a 6% jump in average C-section rates. Yet, in the case of non-paid claims there is no apparent discontinuity in C-section rates. Consistent with the graphical evidence, the estimates in column (1) of Table 7 show, for paid claims, a statistically significant coefficient of about 1.4 percentage points that reflects an increase of 6% in C-section rates. Adding additional covariates in columns (2) and (3) of Table 4, resulted in statistically significant coefficients of 1 and 0.9 percentage points, respectively. In non-paid claims, the coefficient estimates in columns (4)-(6) of Table 7 are small and statistically insignificant, supporting the interpretation that the fear of litigation plays a role in physicians' response.

*The Role of Patients' Socioeconomic Status.* Another way to learn about the causal relationship between the threat of a lawsuit and treatment patterns is by analyzing physicians' response by patients' socioeconomic status. There are two main reasons to think that physicians are more responsive to a threat of a lawsuit in patients of a high socioeconomic status than in patients of a low socioeconomic status. First, patients of a high socioeconomic status are thought to have better access to the legal system (Burstin et al. (1993)), making them more likely to sue in the case of subsequent adverse events. Second, patients of a

high socioeconomic status are considered to be less constrained in their choice of prenatal physicians (Hoerger and Howard (1995)), magnifying the reputational aspects of a lawsuit. I test the hypotheses that physicians are more responsive to an adverse event when treating higher socioeconomic status patients, by using the mothers' type of insurance carrier. Since Medicaid is a means based program, the population of mothers under Medicaid is likely to be of a lower socioeconomic status relative to the population of mothers insured by a private carrier.

Figures 10(a)-(b) plot average C-section rates for mothers under private insurance and Medicaid respectively, and Table 8 presents the estimation results similar to the specifications in Table 4, using one regression with separate coefficient for the two patient types. Figure 10 shows a clearly discernible jump in average C-section rates in mothers under private insurance of about 1.5 percentage points, which implies an increase in C-section rates of about 5% . For mothers under Medicaid there appears to be a much smaller increase in C-section rates. The estimates in column (1) of Table 8 show, for privately insured mothers, a statistically significant increase of 1.6 percentage points. Column (2) shows a statistically significant coefficients of 0.91 and Column (3) show an insignificant coefficient of 0.76 percentage points. The estimation results for mothers under Medicaid show smaller and insignificant coefficients.

*The Role of Experience.* Little is known about the interaction between physicians' experience and the effect of litigation on practice patterns. Highly experienced physicians are likely to have a more established reputation and thus, it is expected that they would be less sensitive to the reputational implications of an adverse event. According to an interpretation of the effect of the adverse event as a response to patients' negative outcomes, other things being equal, experienced physicians are more likely to be exposed to prior adverse events, making them less sensitive to subsequent adverse events. I study if as the two interpretations predict, less experienced physicians respond more to the adverse event, by exploiting information on physicians' educational history. Experience is defined as the time between the beginning of residency and the adverse event. This measure of experience was chosen

over other options for two reasons: (1) it is available for the largest number of physicians in the sample, thereby leading to the lowest loss of estimation power; (2) other measures, like the year a physician began to practice, leave more room for interpretation and thus include some outliers. This experience measure is available for 448 of the 459 physicians in the adverse event panel. As Figure 11 shows, the distribution of experience has a median of 16 years, thus I split the physician sample into two groups: high-experience, with more than 16 years of experience at the time of the adverse event, and low-experience, with 16 years of experience or less at the time of the adverse event.

Figures 12(a)-(b) show average per period C-section rates over the five years of the adverse event panel for the low-experience and high-experience physicians respectively, and Table 9 displays the estimation results. Figure 12(a) shows a jump of roughly 2 percentage points in average C-section rates for low-experience physicians. In Figure 12(b), there is no apparent change in C-section rates following the adverse event, for high-experience physicians. The estimation results in Column (1) of Table 9 show that average C-section rates for low-experience physicians jumped by 2.3 percentage points, reflecting a jump of roughly 9% in C-section rates. The estimates in columns (2) and (3) show a statistically significant increase of 1.8 and 1.9 percentage points respectively. For high-experience physicians, the estimation results in column (4) of Table 9 show, consistent with the graphical evidence, a very small and statistically insignificant increase in C-sections.

The results show that, as both interpretations of the effect of the adverse event predict, the response is concentrated among low-experience physicians. In order to try to distinguish between the two interpretations it would be interesting to test if low-experience physicians responded more to the adverse event because they have less exposure to prior adverse events. To do this, I divide physicians into two groups, those with prior litigation experience and those with no prior litigation experience. A stronger response in the group with no prior litigation history would indicate that physicians respond to the negative outcome, and prior exposure to adverse events generates a weaker response. It is important to note that physi-

cians may have been exposed to bad outcomes which did not result in litigation and hence, are not recorded in the data, and therefore this test should not be viewed as conclusive about the nature of the interaction of the response with experience.

Average C-section rates for the two groups are plotted in Figure 13(a)-(b) and Table 10 shows the estimation results. Examining Figure 13, it appears that in both groups there is a jump in C-section rates of roughly one percentage point. Column (1) of Table 10 shows a 1 percentage point increase, but the estimates are not statistically significant. The estimates in Columns (2) and (3) of Table 10 are 0.9 and 0.7 respectively and both are not statistically significant. Column (4) of Table 10 shows that for physicians with prior claim history there is a statistically significant increase of 1.3 percentage point. The estimates in columns (5) and (6) of Table 10 both show a statistically insignificant of about 0.8 percentage points. The evidence suggest no interaction between the response to the adverse event and prior claim history.

## **5 Response to News About a Lawsuit**

Medical malpractice insurance policies typically require to report any incident in which a patient may be considering filing a claim, promptly following the incident. Figure 14 shows a histogram of the frequencies of the time between the adverse event and the report to the insurer. 95% of the claims are reported less than two years following the adverse event, consistent with the Statute of Limitation which typically places a time limit of two years from the adverse event on pursuing a legal remedy. Assuming that physicians are likely to comply with this requirement, the time of report of a claim to the insurer coincides with the time physicians are first contacted regarding a claims and learn that they are likely to be facing a lawsuit. Hence, I use a similar analysis, using the time of first contact as a proxy for news about a malpractice claim, in order to study the effect of fear of litigation separately from the response to an adverse event. I concentrate on malpractice claims reported more

than a year after the adverse event, for which the time of report is far enough from the adverse event and thus likely to be a better proxy for news about a lawsuit.

## 5.1 Selection Around a First Contact

As in the case of the adverse event, it is important to check whether there was a change in the patient sample composition around the time of the first contact. Figure 15(a) plots per period birth numbers, showing no apparent change in the sample size around the adverse event. Figure 15(b) plots the per period rate of high-risk mothers in the first contact panel. It shows that the rate of high risk mothers is quite smooth around the report of the adverse event. Figure 15(c) Plots the mean age of mothers in the first contact panel. It shows an upward trend in the mean age of mothers over time, but there is no sharp discontinuity in the period following the adverse event. Finally, Figure 15(d) plots the per period share of privately insured mothers, showing no sharp change around the first contact. Table 11 confirms these observations, indicating no finding of a change in the risk level of mothers around the time of first contact.

Here too, I fit a linear probability model, estimating the effect of age, each of the high-risk factors and insurance type, on the probability of undergoing a C-section in the pre-event period. I plot the average predicted C-section rates for the entire period of the panel in Figure 16. The Figure shows no apparent jump in predicted C-section rates, as the estimate in Table 12 confirms.

## 5.2 Response to a First Contact

Figure 17 plots average per period C-section rates for all claims in the first contact panel that were reported more than a year after the adverse event. Similarly to the analysis above, a quadratic regression model fit is added separately to the periods before and after

the time of report. The figure shows a modest increase in C-section rates following the first contact. The corresponding estimates are displayed in Table 13. Column (1) reports the baseline regression estimations. The estimation results show a statistically insignificant increase of about 0.5 percentage points in C-section rates following the first contact regarding a malpractice claim. In columns (2) and (3), additional covariates are added analogous to the analysis of the adverse event panel, showing similar results.

In the previous section I found that physicians respond by considerably increasing C-section rates following an adverse event in cases for which the adverse event is likely to be followed by a lawsuit. That is, when a claim is anticipated, the response preempts the claim itself. It may not be surprising then, that when physicians are contacted about an anticipated claim, there is no evidence of a change in practice patterns. In order to measure the effect of news regarding a lawsuit on treatment, one needs to isolate claims which were not anticipated by physicians. Assuming that successful claims are more anticipated than unsuccessful claims, the report of unsuccessful claims is more likely to reflect “bad news”. Thus, I study the response of physician to “bad news” about a lawsuit by splitting the sample, once more, to paid and non-paid claims.

Figures 18(a)-(b) plot average C-section rates for paid and non-paid claims, respectively. Figures 18(a)-(b) indicate that for non-paid claims there is a discontinuity in C-section rates after the time of the first contact and for paid claims there is no parallel jump. The estimation results in columns (1)-(6) of Table 14 show an increase in C-section rates of about 2 percentage points for non-paid claims which are borderline insignificant (P-values of 0.143-0.064 ) and very small and insignificant estimates for paid claims. These results suggest that physicians respond to new information about a lawsuit. However, one can not rule out the hypotheses that physicians do not respond to news about a lawsuit.

## **6 Response of Peers to an Adverse Event**

A further question that arises in this context is whether physicians' lawsuits affect their peers. The entire department or hospital may change treatment patterns in response to a lawsuit, or, possibly close colleagues who work together with the treated physician may change their practice patterns. I address this question by using the same method that was used to study the short-run response to the adverse event in the previous sections. In this section, to decrease computation time, inpatient discharge data is aggregated and transformed from a patient-discharge unit of observation to a physician-quarter unit of observation. I generate a five year balanced panel similar to the adverse event Panel, but instead of including the treated physicians, all the physicians who are affiliated with the hospital of the treated physician (like in the previous section, affiliation to a hospital is defined as the hospital in which most of a physician's deliveries are performed) and appear throughout the relevant 5 year time period are included ("peer panel"). This generates a data set of 45,440 observations which include 558 physicians, some of whom appear more than once in the sample.

I first examine if, there a hospital-wide response to the adverse event. Figure 19 depicts average hospital C-section rates 10 periods before and 10 periods after the adverse event. The figure shows that there is an upward trend in C-section rates in the peer panel but it appears to be smooth around the adverse event, implying no evidence of hospital-wide response to the adverse event. The estimates in column (1) of Table 15 confirm this impression, showing a statistically insignificant coefficient of 0.001.

Next I test whether the adverse event affects treated physicians' close peers. In order to study this question, I generate a measure of "closeness" between physicians. The measure is created based on three parameters: physician experience, patient geographical proximity and patient socioeconomic status. Geographic location is calculated using the most frequent zip-code among each physician's patients. This location is used in order to calculate the distance between the main practice area of the treated physician and each of his colleagues. The rate of mothers under Medicaid that were treated by the physician prior to the time of adverse event is used as a measure of patients' socioeconomic status. Close peers are defined

as peers who work at the same hospital with similar experience (a difference of no more than 3 years), who treat patients in adjacent neighborhoods (up to a 10 miles distance), and with similar socioeconomic background (difference in the rate of mother under medicaid is less than 0.4). Figure 20(a)-(b) plot average C-section rates, for close and remote peers respectively. In Figure 20(a) there is a discernible jump of about 1 percentage point in C-section rates while in Figure 20(b), the figure appears to be smooth around zero. Columns (2)-(3) of Table 15, show a statistically significant coefficient of 1.3%, for close peers, and, a small and insignificant coefficient for remote peers. These results suggest that while there is no hospital-wide response to the adverse event, close peers - possibly close colleagues who work together with the treated physician tend to perform higher rates of C-section following the adverse event.

## 7 Conclusions

Despite its central importance to the design of malpractice law, very little is known about the effect of malpractice law on medical treatment, let alone about its underlying mechanisms. This study investigated the role of physicians' exposure to malpractice litigation on medical treatment patterns. In addition to rigorously measuring the effect of an adverse event on C-section rates, this study sheds light on the mechanisms that underlie the response.

Following an adverse event physicians increase C-section rates by roughly 4% and this effect persists for at least 4.5 years following an adverse event. These findings are important because they show that medical malpractice litigation encourages physicians to adopt more conservative and costly treatment strategies. The role played by fear of litigation in eliciting physicians' response is supported by several additional findings. First, adverse events which ultimately result in an unsuccessful claims, and are perceived at the time of the adverse event as less likely to harm physicians' reputation, do not lead to an increase in C-section rates. Second, physicians increase C-section rates more in privately insured patients, who

are likely to have better access to the legal system as well as more freedom to choose their physician. In addition, the observed increase in C-section rates following an adverse event is concentrated among less experienced physicians. However, responses of physicians with and without prior malpractice claim histories are not significantly different. These results are inconsistent with a theory of response to the negative outcome which brought about the adverse event.

The evidence in this paper suggest that, potential reputation loss following a malpractice claim, leads to a change in physician treatment patterns, possibly resulting in excessively conservative behavior. In future work it would be interesting to analyze optimal medical malpractice law in the light of these finding. In addition, it would be interesting to extend the analysis to other areas of health care provision and test whether these results apply to other aspects of healthcare provision.

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**TABLE 1**

Summary Statistics - Inpatient Data: All Sample, Adverse Event and First Contact Panels

	Full Sample	Adverse Event Panel	First Contact Panel
	(1)	(2)	(3)
Age (median)	27	27	27
Mother Hispanic	18.8%	12.4%	13.2%
Mother African American	21.3%	18.5%	19.2%
Mother Other Race	59.9%	69.2%	67.7%
Anemia	8.4%	7.6%	7.5%
Breech Position	3.5%	3.6%	3.5%
Diabetes	0.7%	0.6%	0.6%
Early Onset	7.5%	6.7%	6.8%
Hemorrhage	1.9%	1.8%	1.8%
Hypertension	4.8%	4.3%	4.4%
Multiple Gestation	1.1%	1.1%	1.1%
Obesity	0.3%	0.2%	0.5%
Oligohydramnios	2.4%	1.8%	1.9%
Distress	3.3%	3.9%	3.3%
Polyhydramnios	0.6%	0.5%	0.6%
Previous C-section	14.1%	13.1%	13.4%
Medicaid	41.7%	34.7%	35.5%
Private	48.4%	56.9%	56.2%
Physician #	2,307	459	494
Observations	2,981,742	403,336	434,771

NOTE. Table entries are means unless otherwise noted. Column (1) includes all the deliveries in the Florida Inpatient Data in the years 1992-2008. Column (2) includes all the deliveries in the adverse event panel. Column (3) includes all the deliveries in the first contact Panel.

**TABLE 2**

## Selection Around an Adverse Event - High-Risk, Age &amp; Insurance Type

	Age		High-Risk		Private Insurance	
	Baseline (1)	Controls (2)	Baseline (3)	Controls (4)	Baseline (3)	Controls (6)
Event dummy	-0.0018 (0.0050)	-0.0013 (0.0050)	0.0160 (0.0200)	0.0107 (0.0725)	0.0081 (0.0084)	0.0086 (0.0082)
2nd order year quarter polynomial	no	yes	no	yes	no	yes
Number of physicians	459	459	459	459	459	459
Observations	403,336	403,336	403,336	403,336	403,336	403,336

NOTE. All columns report estimates of models akin to the baseline model specified in equation (1), replacing C-section with high-risk, age, & share of privately insured mothers. High-risk includes the following conditions: Previous C-section, breech position, multiple gestation, hypertension, early onset, hemorrhage, obesity, diabetes, polyhydramnios, oligohydramnios & distress. Columns (2), (4) & (6) add a quadratic polynomial for the relevant underlying quarter. Standard errors clustered by physician shown in parenthesis.

**TABLE 3**

## Selection Around an Adverse Event - Predicted C-section Rates

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	<u>predicted C-section</u>
Event dummy	0.0030 (0.0026)
Number of physicians	459
Observations	403,336

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NOTE. The table reports estimates of a models akin to the baseline model specified in equation (1), replacing C-section with predicted C-section. Standard errors clustered by physician shown in parenthesis.

**TABLE 4**

## Short-Run Effect of an Adverse Event

	Baseline (1)	Basic Controls (2)	Full Controls (3)
Event dummy	0.0115 (0.0047)	0.0090 (0.0039)	0.0074 (0.0036)
Patient characteristics	no	yes	yes
Physician & quarter FE	no	no	yes
Number of physicians	459	459	459
Observations	403,336	403,336	403,336

NOTE. All columns report estimates of models akin to the baseline model specified in equation (1). Column (2) includes, in addition to the baseline specification, a quadratic polynomial for age, dummy variables for race and for patients' conditions as follows: previous C-section, breech position, multiple gestation, hypertension, early onset, hemorrhage, obesity, diabetes, polyhydramnios, oligohydramnios, anemia, distress and feto. Column (3) adds physician and quarter fixed effects. Standard errors clustered by physician shown in parenthesis.

**TABLE 5**

Matching Physician to Same-County-Colleagues, 7 Year Adverse  
Event Panel

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	$\tau_t$ All Physicians (1)	$\tau_t$ Close Match (2)
Time from event		
Pre event period	-0.0099 (0.0024)	-0.0011 (0.0023)
2.5-4.5 years after adverse event	-0.0030 (0.0028)	0.0170 (0.0030)
F-test for Effect of Refrom (Prob>F)	0.0006	0.0000
# of Physicians	338	251

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NOTE. Column 1 includes all the colleagues from the same county excluding colleagues from the same hospital. Column 2 includes all colleagues from the same county with less than a 3 year gap in experience and less than 10 percentage points gap in C-section rate in the 10 quarters pre-event period. Pre-event period is defined as the 5 six-months periods prior to the adverse event. 2.5-4.5 years after adverse event is the 5 six-months periods starting 2 years following the adverse event. Standard errors are calculated using bootstrapping, analytic asymptotic variance estimator (Abadie and Imbens (2006)) show very similar results.

**TABLE 6**

## Long-Run Effect of an Adverse Event, Event Study Approach

	Baseline		Full Controls	
	Coefficient	Standard Errors	Coefficient	Standard Errors
Period -10	-0.0001	(0.0057)	0.0060	(0.0060)
Period -9	0.0008	(0.0059)	0.0021	(0.0059)
Period -8	-0.0003	(0.0055)	-0.0038	(0.0053)
Period -7	-0.0028	(0.0053)	-0.0028	(0.0053)
Period -6	-0.0018	(0.0051)	0.0000	(0.0046)
Period -5	0.0061	(0.0047)	0.0043	(0.0043)
Period -4	-0.0020	(0.0045)	-0.0052	(0.0038)
Period -3	0.0025	(0.0044)	-0.0002	(0.0038)
Period -2	0.0009	(0.0042)	0.0014	(0.0034)
Period -1				
Period 0	0.0111	(0.0043)	0.0067	(0.0036)
Period 1	0.0127	(0.0045)	0.0083	(0.0037)
Period 2	0.0139	(0.0045)	0.0109	(0.0038)
Period 3	0.0132	(0.0048)	0.0115	(0.0043)
Period 4	0.0149	(0.0050)	0.0131	(0.0045)
Period 5	0.0120	(0.0056)	0.0089	(0.0053)
Period 6	0.0220	(0.0056)	0.0158	(0.0054)
Period 7	0.0144	(0.0056)	0.0106	(0.0056)
Period 8	0.0256	(0.0057)	0.0211	(0.0060)
Period 9	0.0248	(0.0060)	0.0206	(0.0061)
Quarter dummy	yes	yes	yes	yes
Physician FE	yes	yes	yes	yes
# of Physicians	459	459	459	459
Observations	403,336	403,336	403,336	403,336

NOTE. Baseline regression includes physician and quarter fixed effects. Full controls includes, in addition to the baseline specification, a quadratic polynomial for age, dummy variables for race and for patients conditions as follows: previous C-section, breech position, hypertension, early onset, hemorrhage, oligohydramnios. Standard errors clustered by physician shown in parenthesis.

**TABLE 7**

## Short-Run Effect of an Adverse Event, Successful &amp; Unsuccessful Claims

	Successful			Unsuccessful		
	Baseline	Basic Controls	Full Controls	Baseline	Basic Controls	Full Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Event dummy	0.0145 (0.0053)	0.0103 (0.0044)	0.0087 (0.0042)	0.0049 (0.0091)	0.0056 (0.0076)	0.0042 (0.0068)
Patient characteristics	no	yes	yes	no	yes	yes
Physician & quarter FE	no	no	yes	no	no	yes
Number of physicians	316	316	316	143	143	143
Observations	283,198	283,198	283,198	120,138	120,138	120,138

NOTE. Successful claims are claims which resulted in a payment larger than zero. Unsuccessful claims resulted in a zero payment. All columns report estimates of models akin to the baseline model specified in equation (1). Columns (2) & (4) include in addition to the baseline specification a quadratic polynomial for age, dummy variables for race and for patients' conditions - see notes for table (2). Columns (3) & (6) add quarter and physician fixed effects. Standard errors clustered by physician shown in parenthesis.

**TABLE 8**

## Short-Run Effect of an Adverse Event, Private Insurance Mothers &amp; Medicaid Mothers

	Panel A Private			Panel B Medicaid		
	Baseline	Basic Controls	Full Controls	Baseline	Basic Controls	Full Controls
	(1)	(2)	(3)	(1)	(2)	(3)
Event dummy	0.0163 (0.0057)	0.0091 (0.0049)	0.0076 (0.0048)	0.0042 (0.0075)	0.0072 (0.0060)	0.0057 (0.0054)
Patient characteristics	no	yes	yes	no	yes	yes
Physician quarter FE	no	no	yes	no	no	yes
Number of physicians	459	459	459	459	459	459
Observations	369,739	369,739	369,739	369,739	369,739	369,739

NOTE. Panel A reports estimates for the event dummy interacted with a private insurance dummy. Panel B reports estimates of the event dummy interacted with a Medicaid dummy. All columns report estimates of models akin to the baseline model specified in equation (1), including time and time squared interacted with insurance type. Column (2) includes in addition to the baseline specification a quadratic polynomial for age, dummy variables for race and for patients conditions - see notes for table (2). Column (3) adds physician & quarter fixed effects. Standard errors clustered by physician shown in parenthesis.

**TABLE 9**

## Short-Run Effect of an Adverse Event, High-Experience &amp; Low-Experience Physicians

	Low-Experience			High-Experience		
	Baseline	Basic Controls	Full Controls	Baseline	Basic Controls	Full Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Event dummy	0.0232 (0.0066)	0.0185 (0.0054)	0.0188 (0.0051)	0.0025 (0.0067)	0.0004 (0.0055)	-0.0027 (0.0049)
Patient characteristics	no	yes	yes	no	yes	yes
Physician & quarter FE	no	no	yes	no	no	yes
Number of physicians	246	246	246	202	202	202
Observations	203,255	203,255	203,255	189,767	189,767	189,767

NOTE. Experience counted as of the beginning of residency. High-Experience: more than 16 years of experience, Low-Experience: 16 years or less of experience. All columns report estimates of models akin to the baseline model specified in equation (1). Columns (2) & (4) include, in addition to the baseline specification, a quadratic polynomial for age, dummy variables for race and for patients' conditions - see notes for table (2). Columns (3) & (6) add a physician & quarter fixed effect. Experience is available for 448 out of the 459 physicians in the adverse event panel. Standard errors clustered by physician shown in parenthesis.

**TABLE 10**

## Short-Run Effect of an Adverse Event, Physicians With &amp; Without Prior Claim History

	First Claim			≥ Second Claim		
	Baseline	Basic Controls	Full Controls	Baseline	Basic Controls	Full Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Event dummy	0.0104 (0.0065)	0.0094 (0.0054)	0.0070 (0.0049)	0.0131 (0.0066)	0.0084 (0.0055)	0.0088 (0.0052)
Patient characteristics	no	yes	yes	no	yes	yes
Physician & quarter FE	no	no	yes	no	no	yes
Number of physicians	253	253	253	206	206	206
Observations	215,614	215,614	215,614	187,722	187,722	187,722

NOTE. All columns report estimates of models akin to the baseline model specified in equation (1). Columns (2) & (4) include, in addition to the baseline specification, a quadratic polynomial for age dummy variables for race and for patients' conditions - see notes for table (2). Column (3) & (6) add physician & quarter fixed effect. Standard errors clustered by physician shown in parenthesis.

**TABLE 11**

Selection Around the a First Contact - High-Risk, Age &amp; Insurance Type

	Age		High-Risk		Private Insurance	
	Baseline	Controls	Baseline	Controls	Baseline	Controls
	(1)	(2)	(3)	(4)	(3)	(4)
Event dummy	0.0290 (0.0256)	-0.0975 (0.0921)	-0.0024 (0.0080)	-0.0027 (0.0080)	-0.0065 (0.0105)	-0.0060 (0.0108)
2nd order year quarter polynomial	no	yes	no	yes	no	yes
Number of physicians	232	232	232	232	232	232
Observations	211,951	211,951	211,951	211,951	211,951	211,951

NOTE. First contact sample includes claims reported more than a year after the adverse event. All columns report estimates of models akin to the baseline model specified in equation (1), replacing C-section with high-risk, age, & share of privately insured mothers. High-risk includes the following conditions: Previous C-section, breech position, multiple gestation, hypertension, early onset, hemorrhage, obesity, diabetes, polyhydramnios, oligohydramnios & distress. Columns (2), (4) & (6) add a quadratic polynomial for the relevant underlying quarter. Standard errors clustered by physician shown in parenthesis.

**TABLE 12**

## Selection Around a First Contact - Predicted C-section Rates

---

	Predicted C-section
Event dummy	-0.0024 (0.0042)
Number of physicians	211,951
Observations	232

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NOTE. First contact sample includes claims reported more than a year after the adverse event. The table report estimates of a models akin to the baseline model specified in equation (1), replacing C-section by predicted C-section. Standard errors clustered by physician shown in parenthesis.

**TABLE 13**

## Short-Run Effect of a First Contact

	Baseline (1)	Basic Controls (2)	Full Controls (3)
Event dummy	0.0050 0.0072	0.0081 (0.0060)	0.0052 (0.0057)
Patient characteristics	no	yes	yes
Physician quarter FE	no	no	yes
Number of physicians	211,951	211,951	211,951
Observations	232	232	232

NOTE. First contact sample includes claims reported more than a year after the adverse event. All columns report estimates of models akin to the baseline model specified in equation (1). Column (2) includes in addition to the baseline specification a quadratic polynomial for age dummy variables for race and for patients' conditions as follows: Previous C-section, breech position, multiple gestation, hypertension, early onset, hemorrhage, obesity, diabetes, polyhydramnios, oligohydramnios, anemia, distress and feto. Column (3) adds physician & quarter fixed effects. Standard errors clustered by physician shown in parenthesis.

**TABLE 14**

## Short-Run Effect of a First Contact, Successful &amp; Unsuccessful Claims

	Successful			Unsuccessful		
	Baseline	Basic Controls	Full Controls	Baseline	Basic Controls	Full Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Event dummy	-0.0011 (0.0086)	0.0024 (0.0072)	0.0000 (0.0070)	0.0194 (0.0131)	0.0205 (0.0109)	0.0161 (0.0094)
Patient characteristics	no	yes	yes	no	yes	yes
Physician quarter FE	no	no	yes	no	no	yes
Number of physicians	153	153	153	79	79	79
Observations	143,329	143,329	143,329	68,622	68,622	68,622

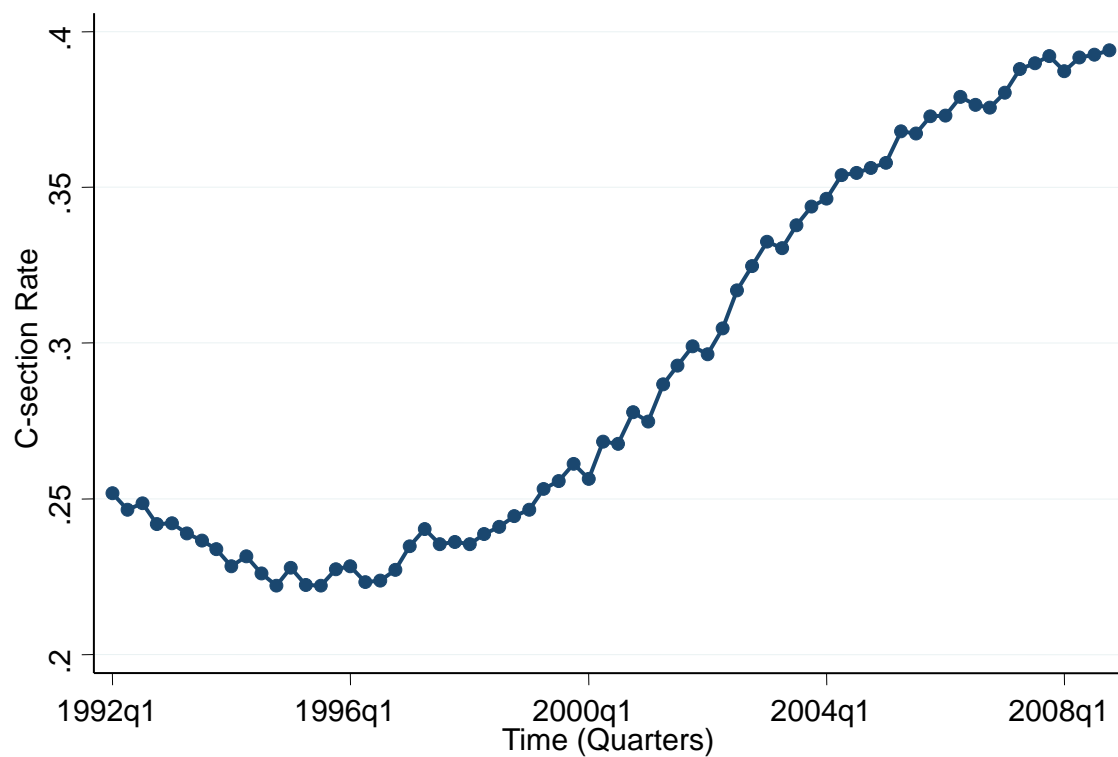
NOTE. First contact sample includes claims reported more than a year after the adverse event. Successful claims are claims which resulted in a payment larger than zero. Unsuccessful claims resulted in a zero payment. All columns report estimates of models akin to the baseline model specified in equation (1). Columns (2) & (4) include in addition to the baseline specification a quadratic polynomial for age, dummy variables for race and for patients conditions - see notes for table (2). Columns (3) & (6) add quarter and physician fixed effects. Standard errors clustered by physician shown in parenthesis.

**TABLE 15**  
Short-Run Effect of an Adverse Event on Peers from the Same Hospital

	All Hosp/Phys (1)	Remote Peers (2)	Close Peers (3)
Event dummy	0.0010 (0.0036)	-0.0028 (0.0024)	0.0129 (0.0060)
Number of physicians	558	373	208
Observations	45,440	21,160	6,960

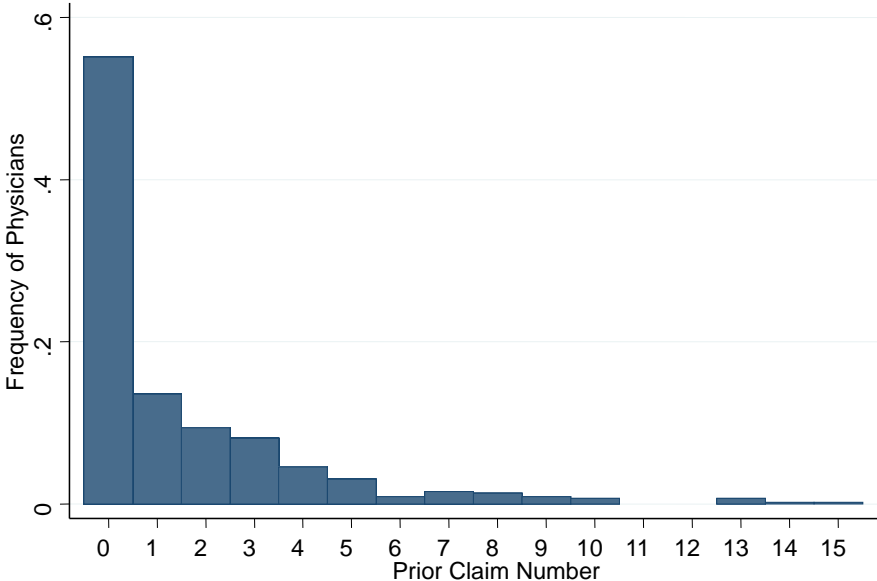
NOTE. The peer sample includes all the physicians from the same hospital who appear through the whole 5 years sample period. Close Peers are peers from the same hospital, with at most a 3 years experience gap, 10 mile distance (using most common patient zip-code), and 0.4 percentage points gap in rate of Medicaid patients, in the pre-event period. remote peers are the colleagues from the same hospital who are not Close to treated Physician. Standard errors clustered by physician shown in parenthesis.

Figure 1  
C-section rates 1992-2008, Florida

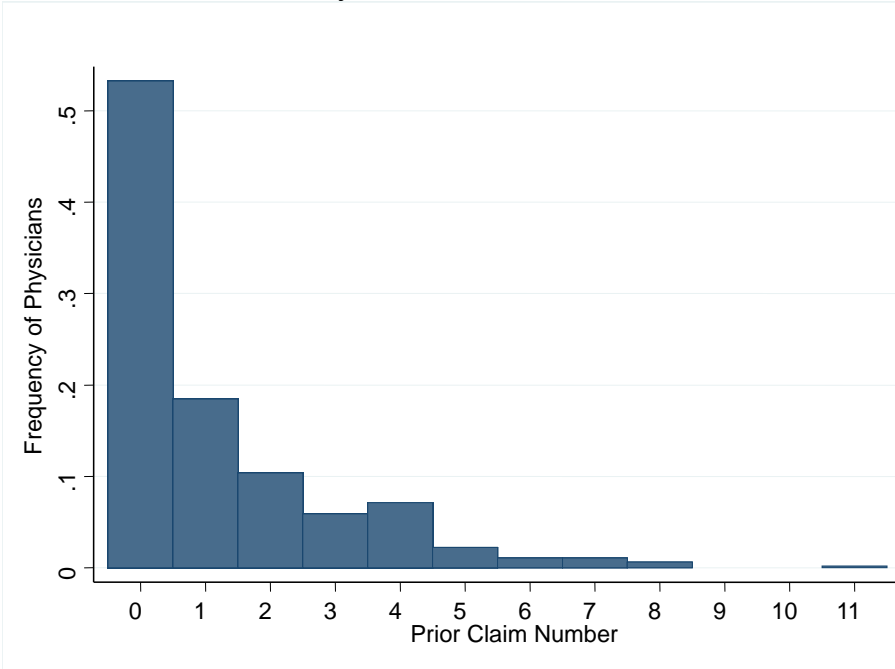


NOTE: The figure depicts C-section rates in Florida from 1992-Q1 to 2008-Q4. The sample consists of all deliveries in the Florida Hospital Inpatient Discharge Data in the relevant time period.

**Figure 2a**  
 Distribution of Physicians' Prior Claims, Adverse Event Panel



**Figure 2b**  
 Distribution of Physicians' Prior Claims, First Contact Panel



NOTE: Panel A and B of this figure depict the frequency of physicians by the number of claims they experienced prior to the adverse event and the first contact respectively. For example, in Panel A, 253 of the 459 physicians in the sample did not experience prior claims. The Florida Medical Professional Liability Files were used to calculate the number of prior claims for each physician.

Figure 3a  
Distribution of Claim Payments, Adverse Event Panel

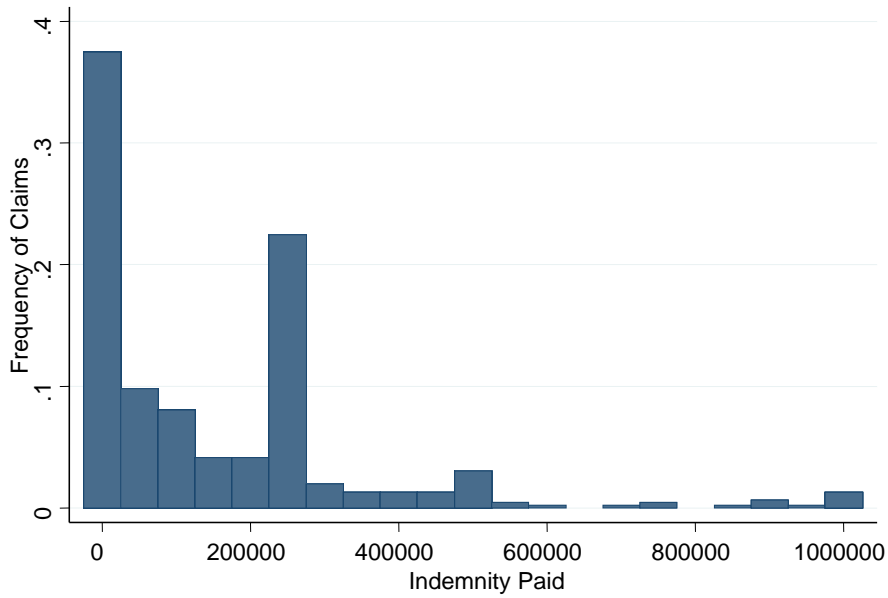
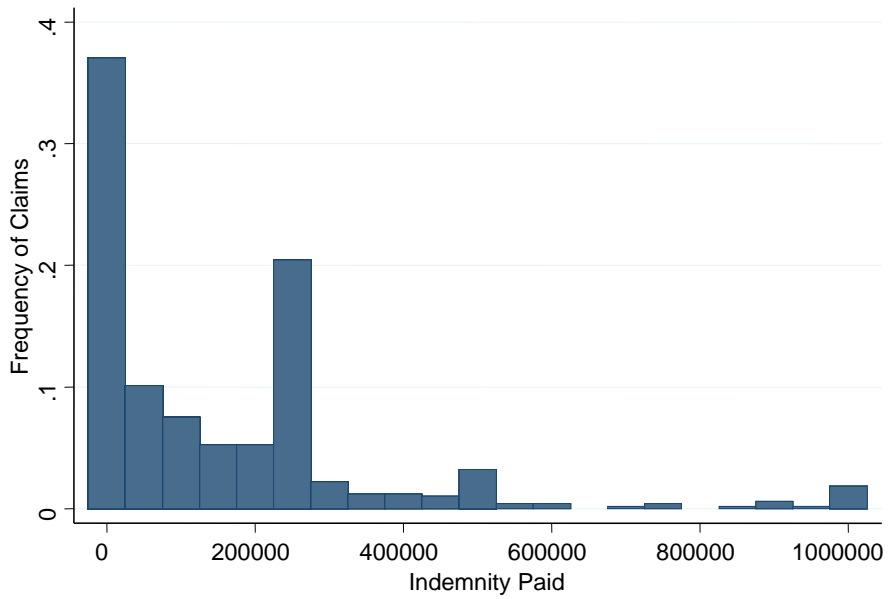


Figure 3b  
Distribution of Claim Payments, First Contact Panel



NOTE: Panels A and B of this figure show the frequency of claim payments rounded to the closest multiple of \$50K, in the adverse event and the first contact panels, respectively. The Florida Medical Professional Liability Files are used to generate the figures. Payments are in nominal terms.

Figure 4a  
Per Period Number of Births, Adverse Event Panel

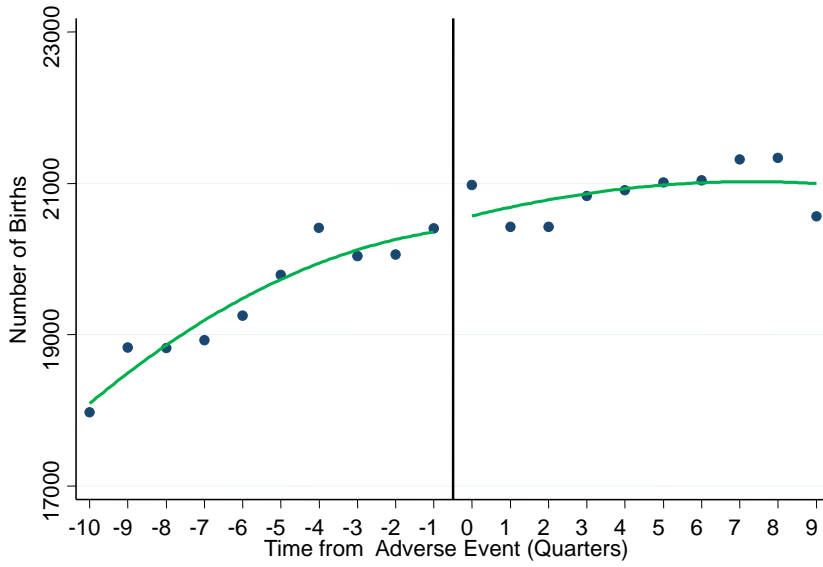


Figure 4b  
Per Period Share of High-Risk Mothers, Adverse Event Panel

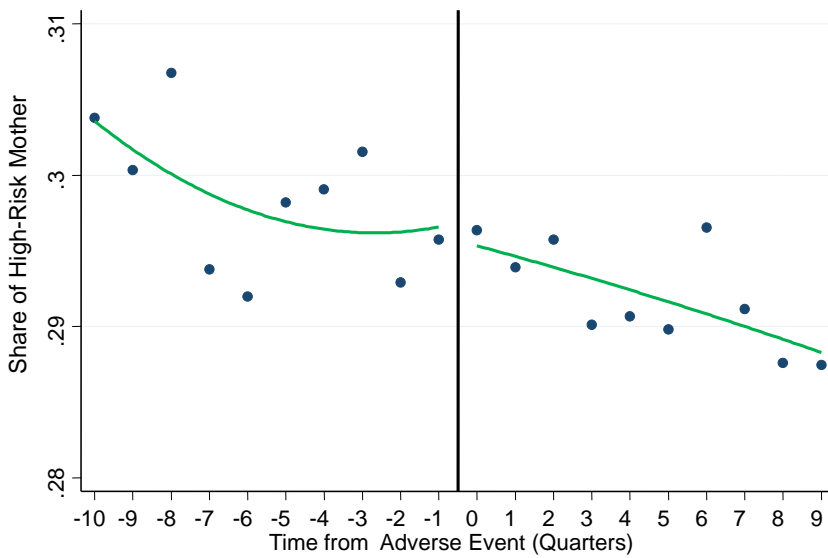


Figure 4c  
Per Period Average Age of Mothers, Adverse Event Pnael

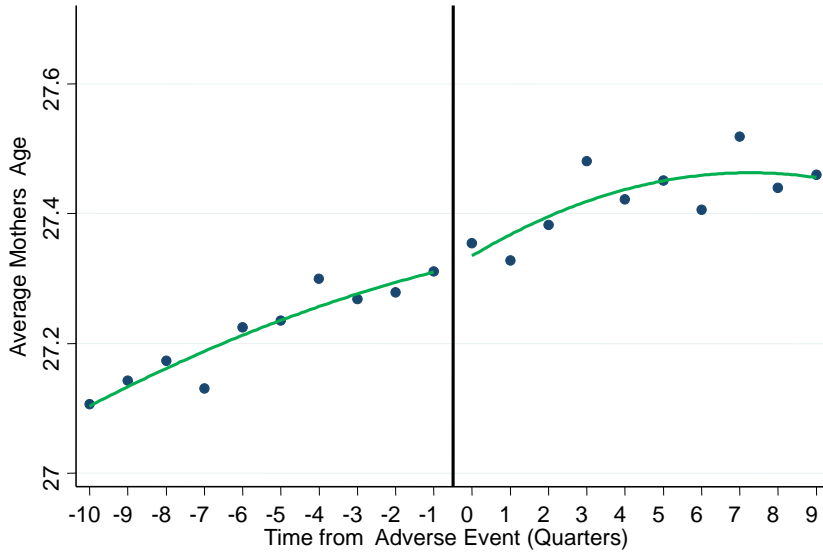
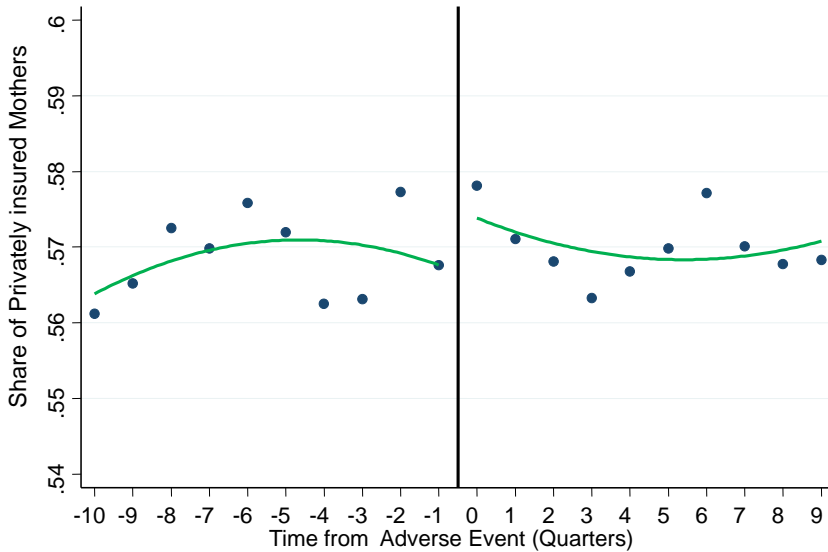
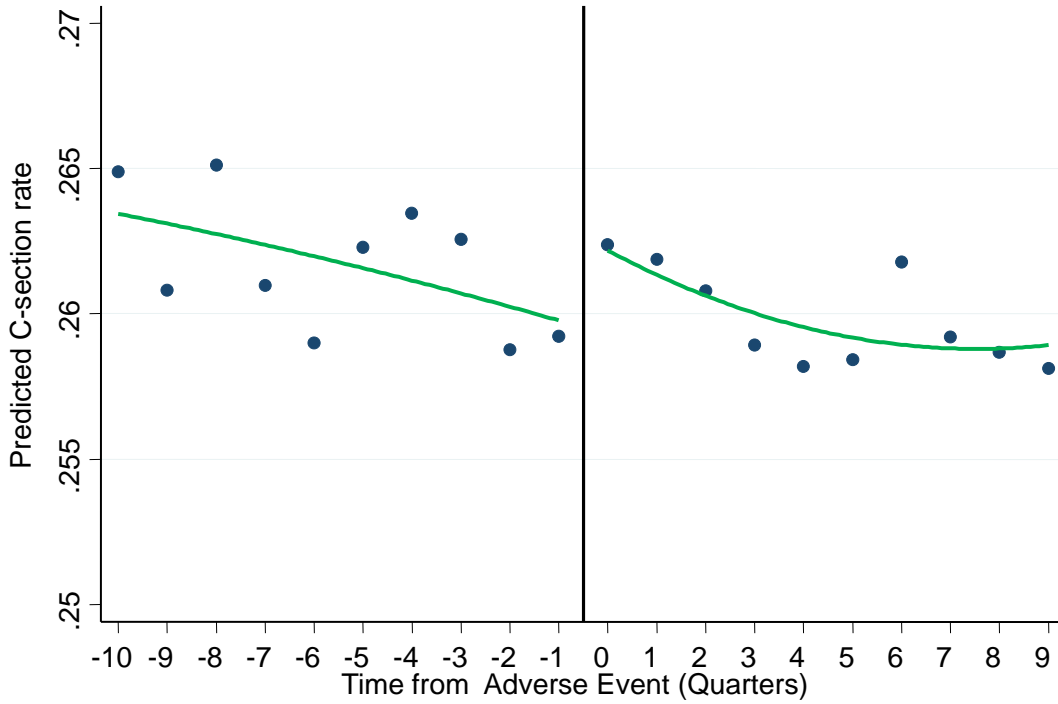


Figure 4d  
Per Period Share of Privately Insured Mothers, Adverse Event Pnael



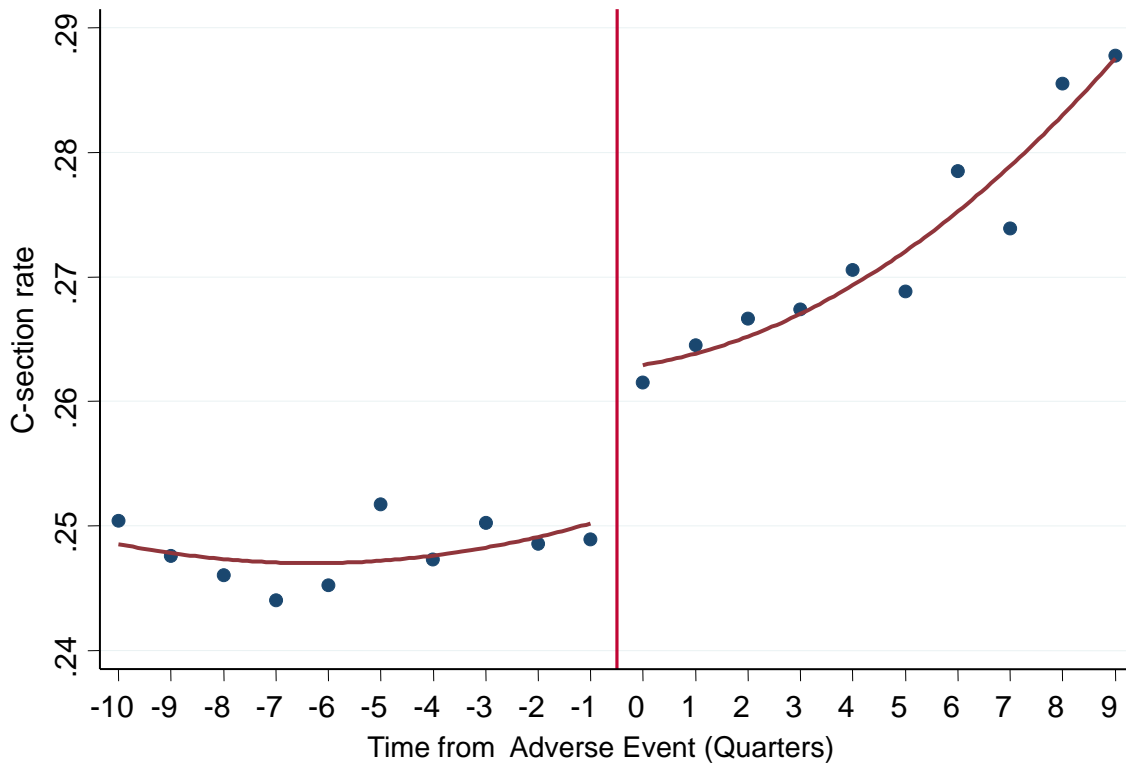
NOTE: These figures show how observable characteristics evolve around the adverse event. The vertical line denotes the time of the adverse event. Panels A-D plot the per-period number of births, Share of high-risk mothers, average mother age and share of privately insured mothers, respectively.

Figure 5  
Selection on Observables, Adverse Event Panel



NOTE: This figure shows predicted C-section rates in the adverse event panel. The vertical line denotes the time of the adverse event. The prediction was done by regressing, using OLS, C-section dummy on the high-risk covariates as well as age and insurance type dummies in the pre-reform period. The figure plots the average per period predicted C-section rate.

Figure 6  
Short-Run Effect of an Adverse Event



NOTE: The figure plots per period C-section rates in the adverse event panel. The vertical line denotes the time of the adverse event.

Figure 7a  
Long-Run Effect of an Adverse Event, Matching Approach

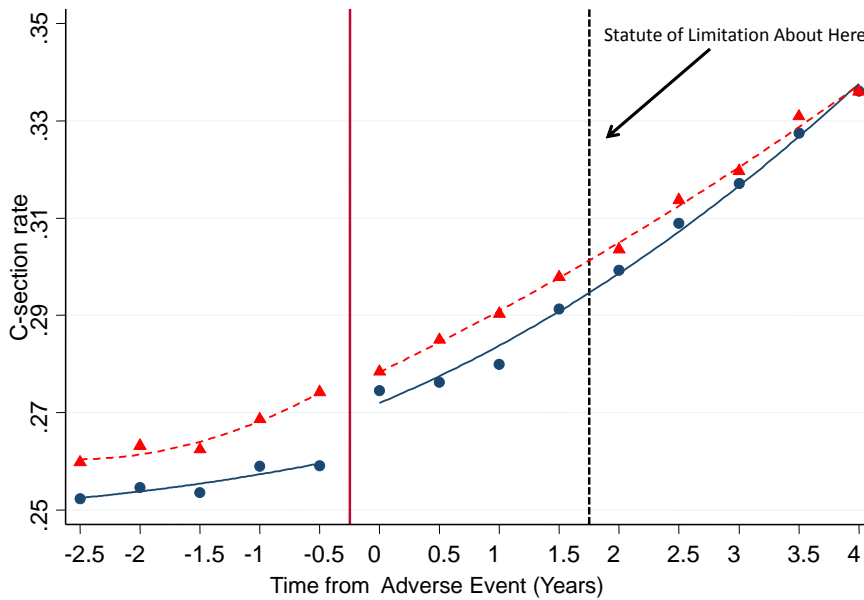
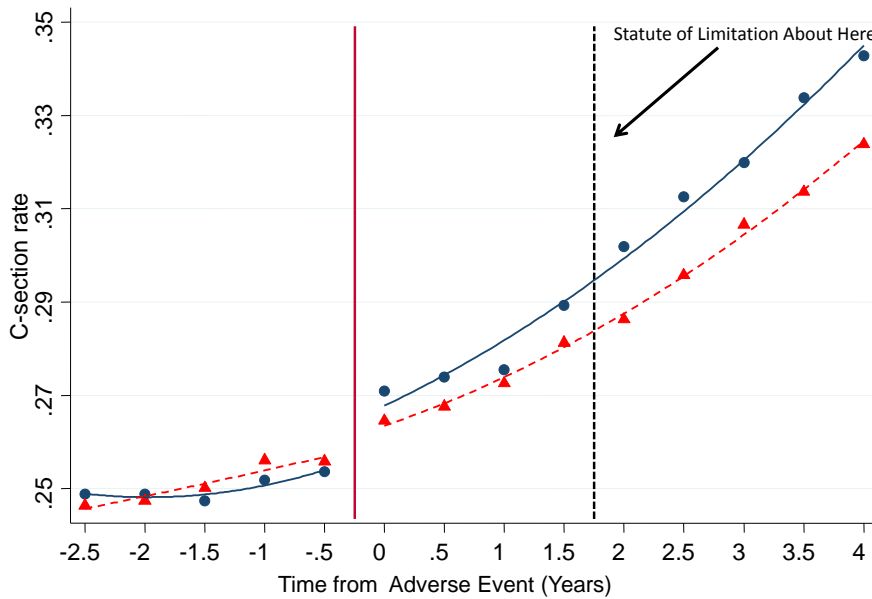
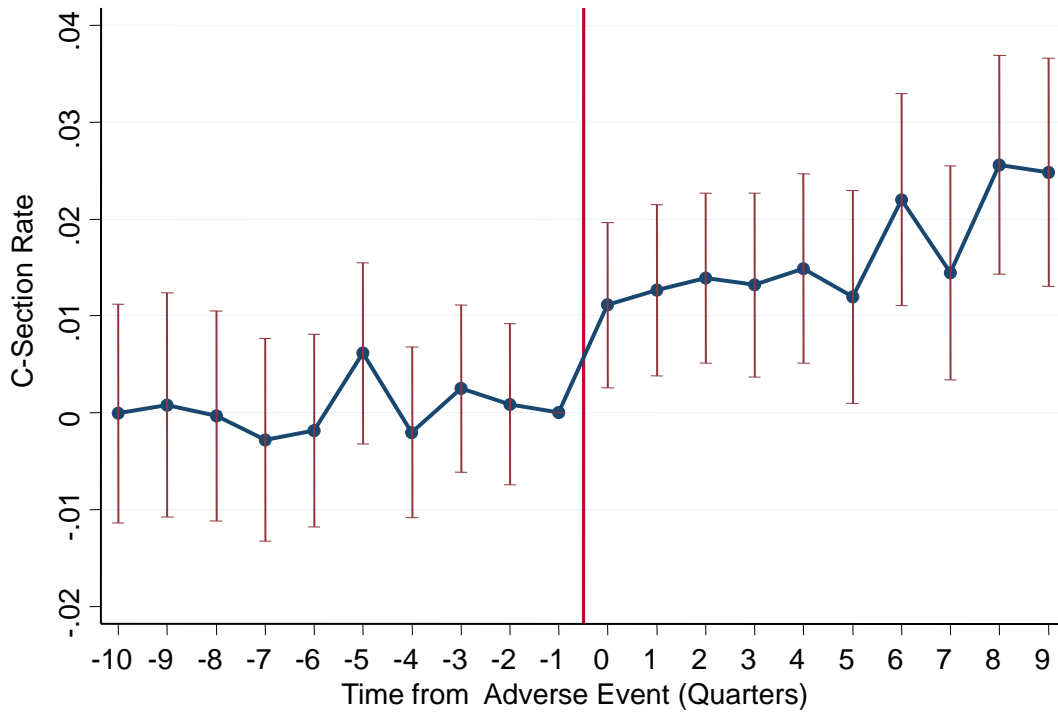


Figure 7b  
Long-Run Effect of an Adverse Event, Matching Approach Similar Colleagues



NOTE: Panels A and B of this figure depict C-section rate in six-months periods 2.5 years before and 4.5 years after the adverse event. The control group in panel A is comprised by physicians from the same county excluding physicians from the same hospital. The Control group in panel B is a subgroup of the Control group in panel A, including only physicians with similar experience and similar pre-event C-section rates. The vertical red line denotes the time of the adverse event and the vertical dashed black line denotes the approximate end of the Statute of Limitation.

Figure 8  
Long-Run Effect of an Adverse Event, Event Study Approach



NOTE: This figure plots the coefficients of dummies for time from injury, obtained from an OLS regression with controls for physician and quarter fixed effects (equation 2). The thin vertical red lines report the 95% confidence interval of the coefficients. Table 6 reports the coefficients and standard errors shown in the figure.

Figure 9a  
Short-Run Effect of an Adverse Event, Successful Claims

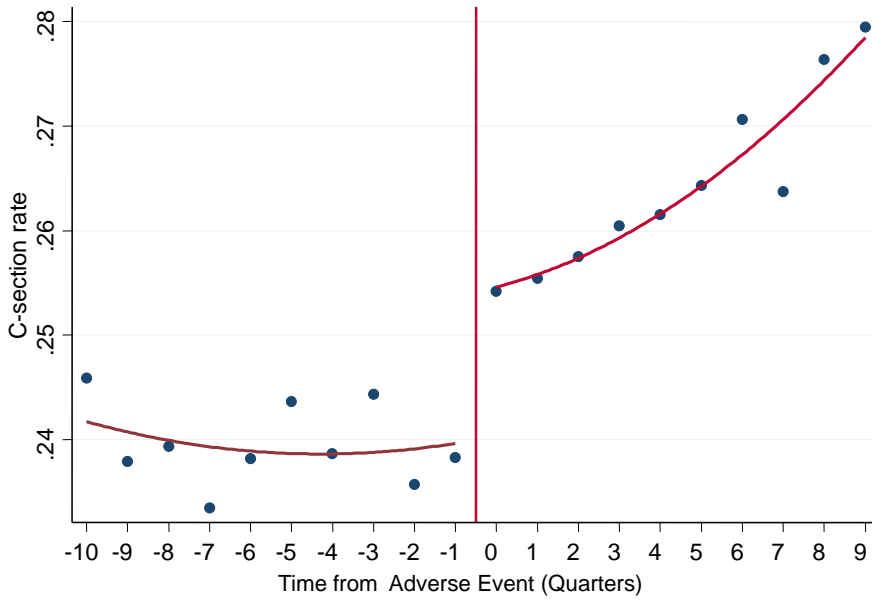
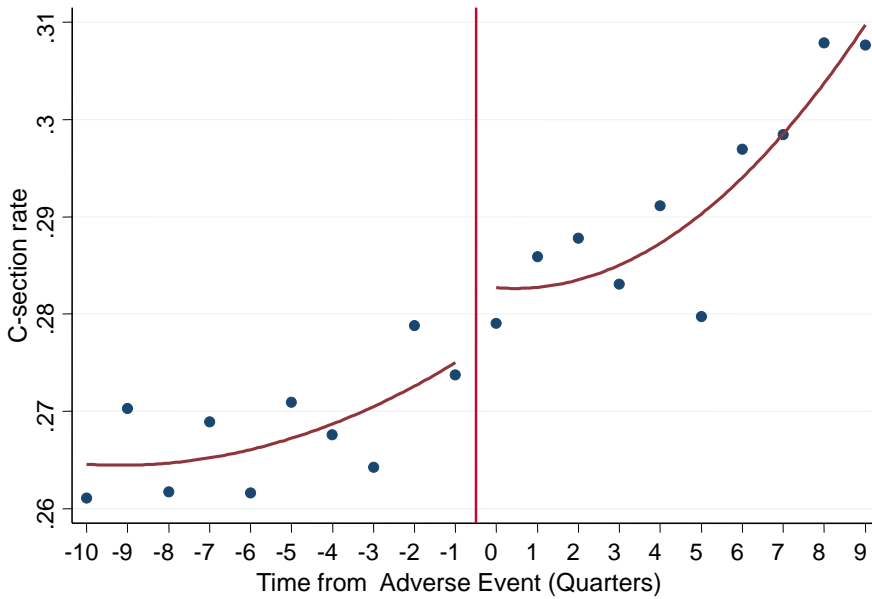


Figure 9b  
Short-Run Effect of an Adverse Event, Unsuccessful Claims



NOTE: Panels A and B of this figure depict per-period C-section rates for Paid and Non-Paid claims respectively, in the adverse event panel. The vertical red line denotes the time of the adverse event.

Figure 10a  
Short-Run Effect of an Adverse Event, Private Insurance Mothers

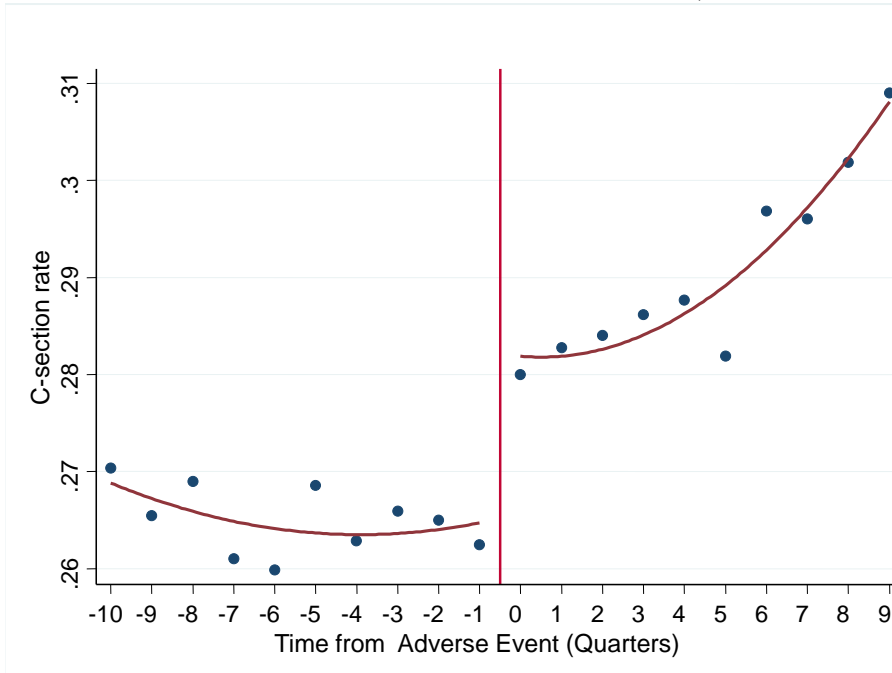
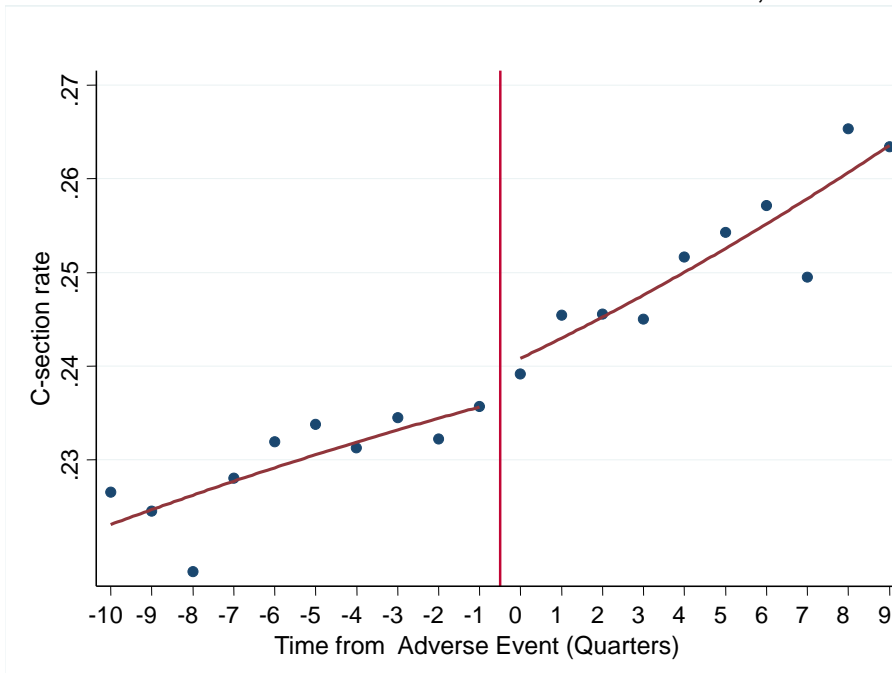
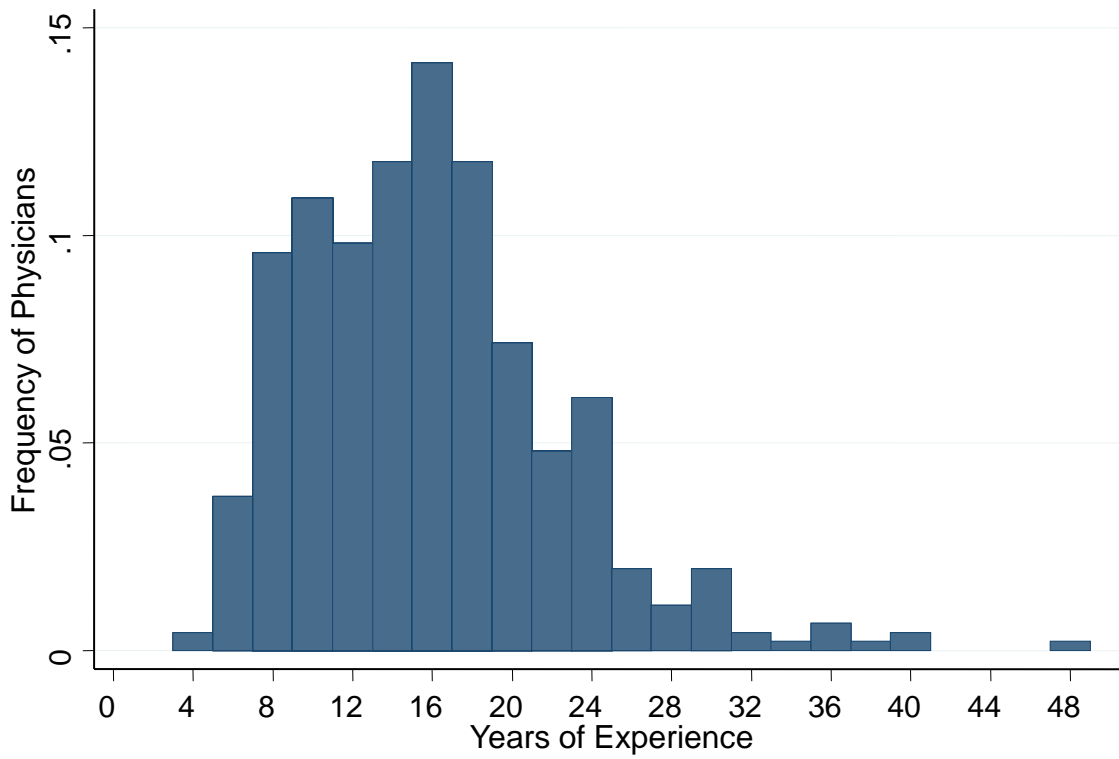


Figure 10b  
Short-Run Effect of an Adverse Event, Medicaid Mothers



NOTE: Panels A and B of this figure depict C-section rates for privately insured mothers and Medicaid mothers, respectively, in the adverse event panel. The vertical red line denotes the time of the adverse event.

Figure 11  
Distribution of Physicians' Experience, Adverse Event Panel



NOTE: This figure depicts frequency of physicians by years of experience. Experience is defined as time from the beginning of residency. The figure uses the Profile Data and the Florida Medical Professional Liability Files to calculate the level of experience at the time of the adverse event.

Figure 12a  
Short-Run Effect of an Adverse Event, High-Experience Physicians

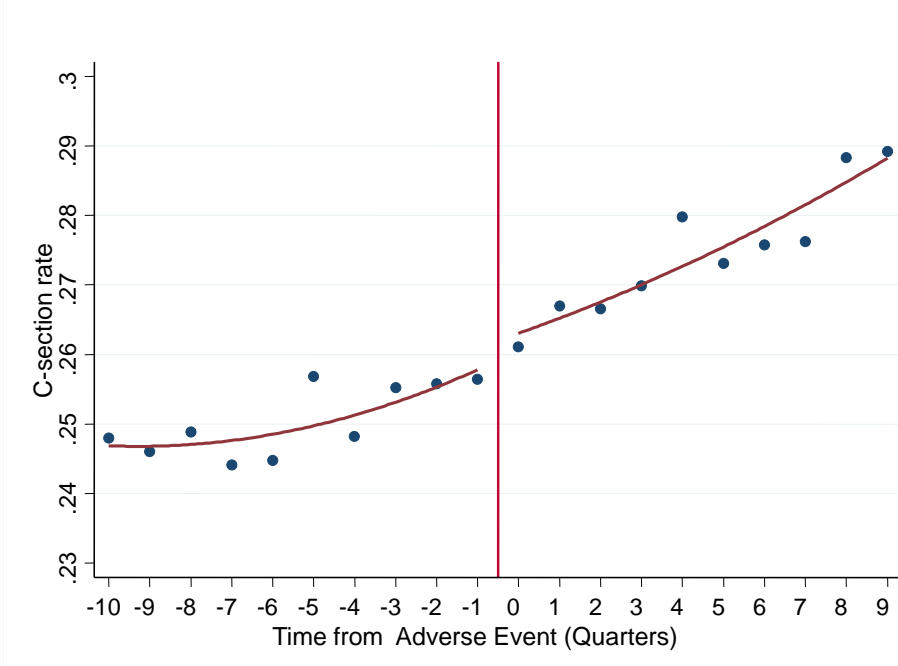
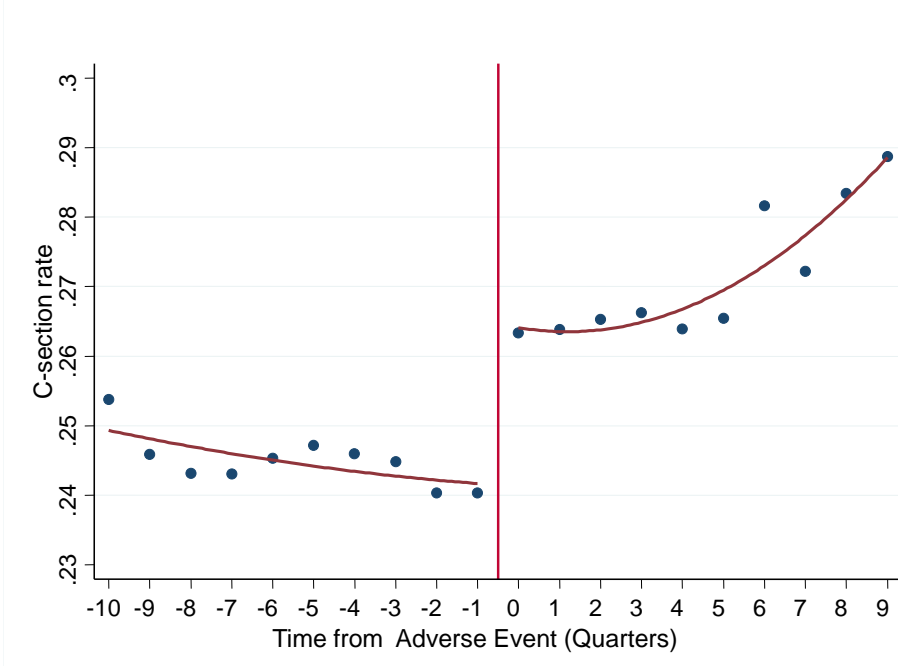


Figure 12b  
Short-Run Effect of an Adverse Event, Low-Experience Physicians



NOTE: Panels A and B of this figure depict C-section rates for high-experience and low-experience physicians, respectively. High-experience physicians are physicians with more than 16 years of experience and low-experience physicians are physicians with 16 years of experience or less. The vertical red line denotes the time of the adverse event.

Figure 13a  
Short-Run Effect of an Adverse Event, Physicians with No Prior Claims

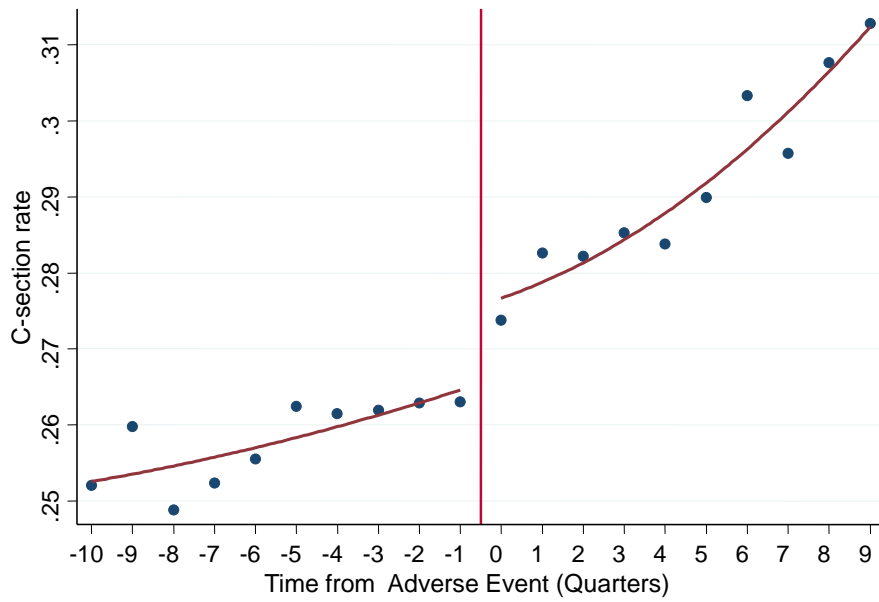
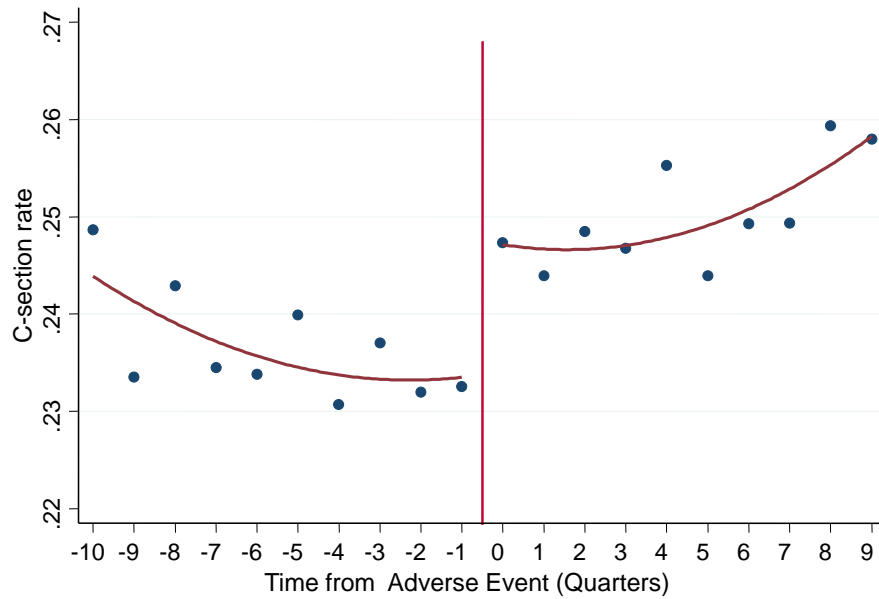
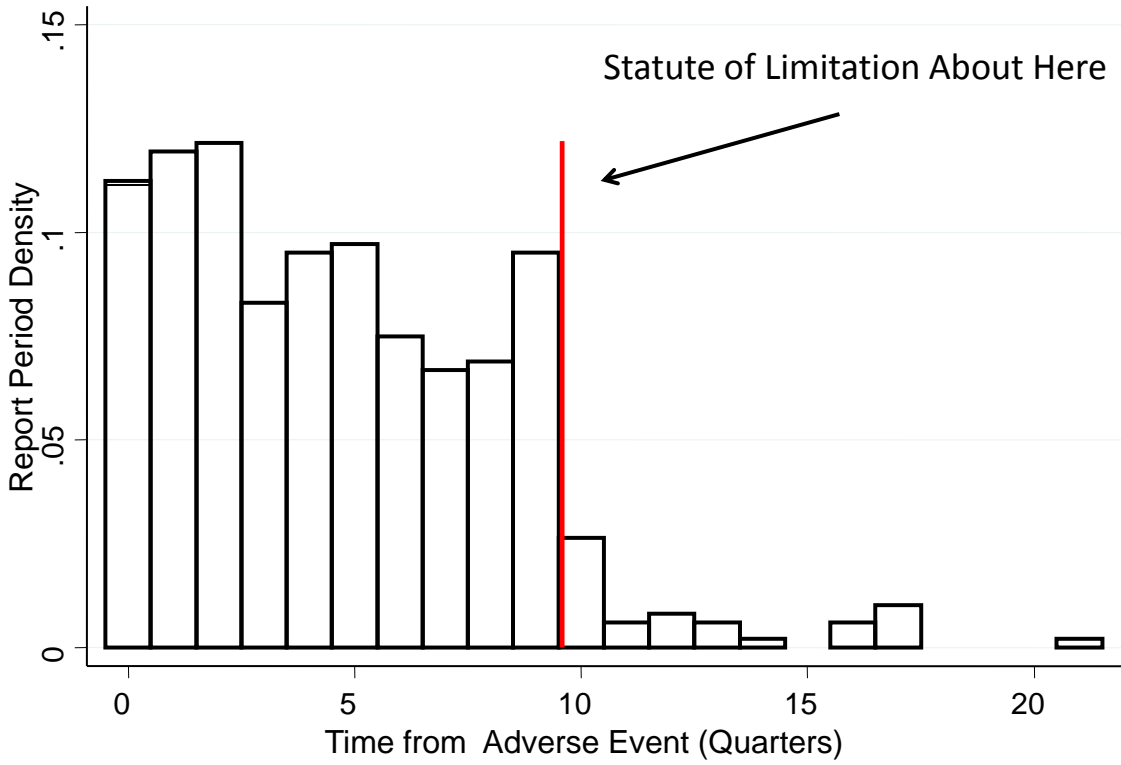


Figure 13b  
Short-Run Effect of an Adverse Event, Physicians with 1 or More Prior Claims



NOTE: Panels A and B of this figure depict C-section rates for physicians without and with prior claim history, respectively. The vertical red line denotes the time of the adverse event.

Figure 14  
Distribution of Claims Report Timing



NOTE: This figure depicts frequency of claims by the timing of report relative to the adverse event.

Figure 15a  
Per Period Number of Births, First Contact Panel

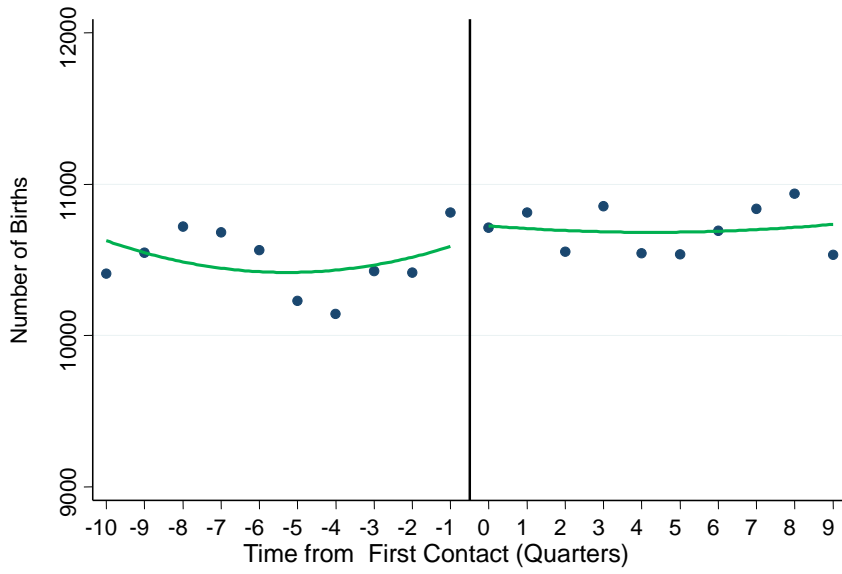


Figure 15b  
Per Period Share of High-Risk Mothers, First Contact Panel

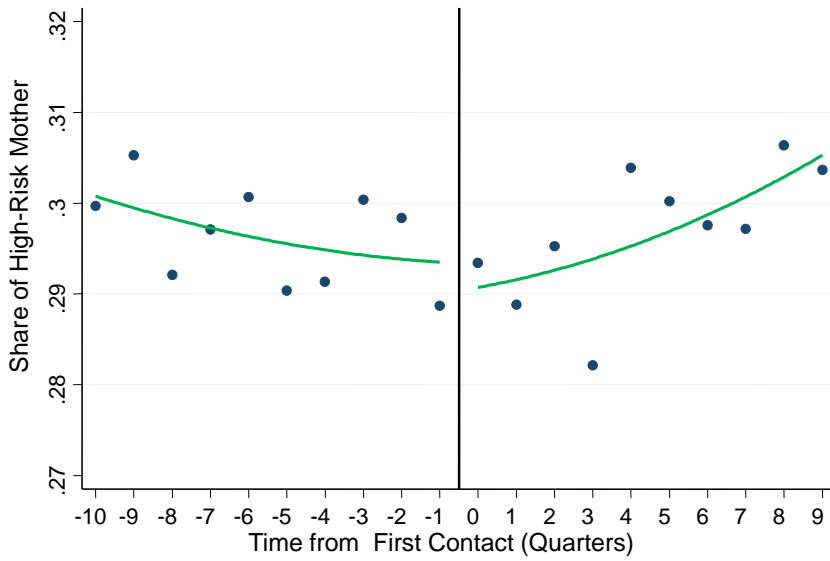


Figure 15c  
Per Period Average Age of Mothers, First Contact Panel

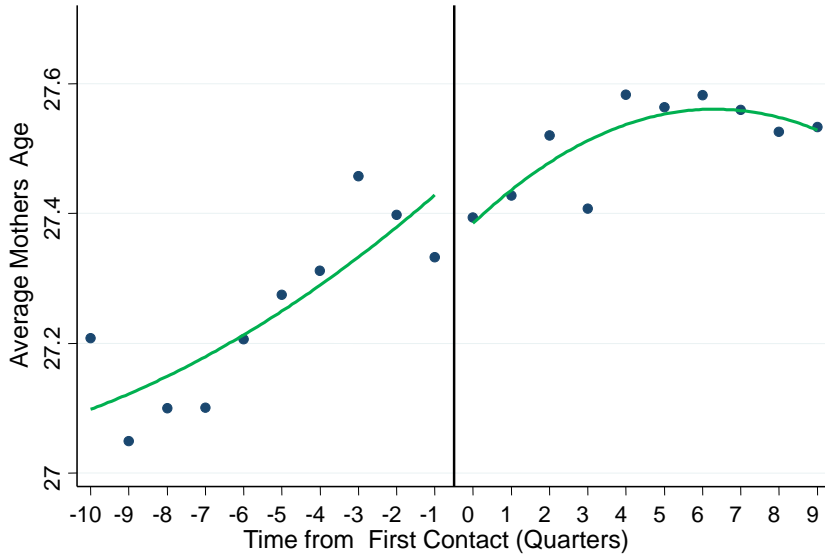
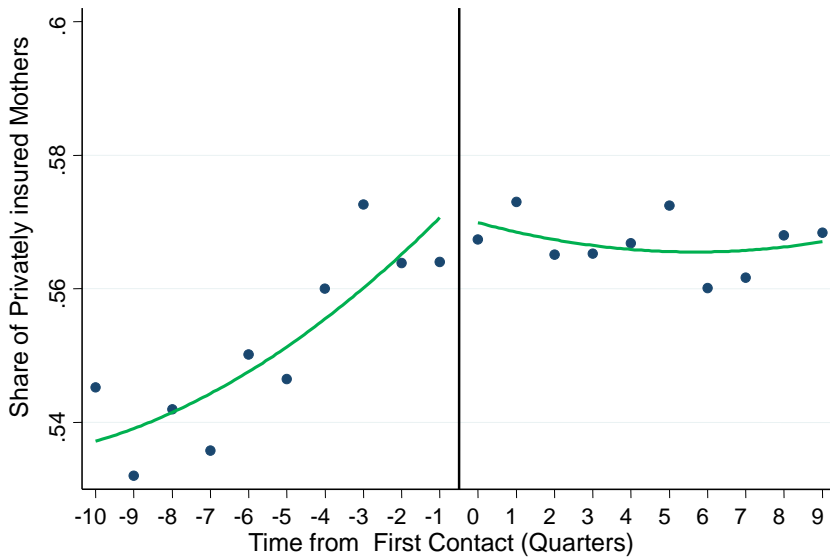
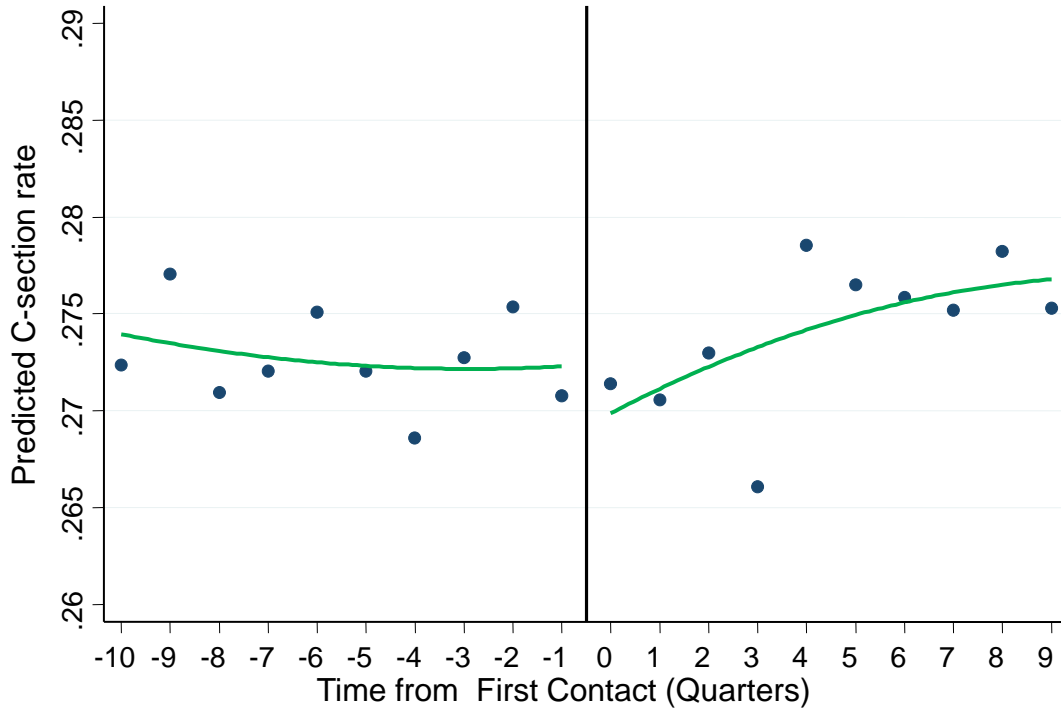


Figure 15d  
Per Period Share of Privately Insured Mothers, First Contact Panel



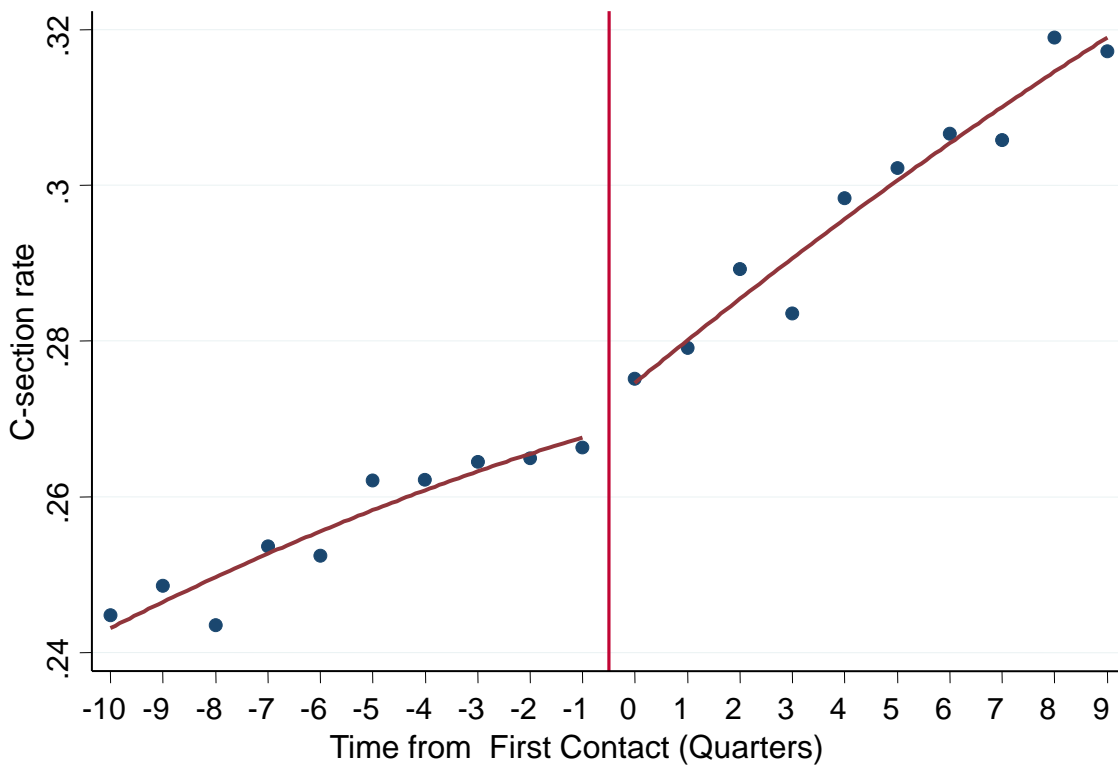
NOTE: These figures show how observable characteristics evolve around the time of the first contact. The vertical line denotes the time of the first contact. Panels A-D plot the per-period number of births, share of high-risk mother, average mother age and share of privately insured mothers, respectively.

Figure 16  
Selection on Observables, First Contact Panel



NOTE: This figure shows predicted C-section rates in the first contact panel, for claims with a first contact a year or more after the adverse event. The vertical line denotes the time of the first contact. The prediction was done by regressing, using OLS, C-section dummy on the high-risk covariates as well as age and insurance type dummies. The figure plots the average per period predicted C-section rate.

Figure 17  
Short-Run Effect of a First Contact



NOTE: The figure plots per period C-section rates in the first contact panel, for claims reported more than a year after the adverse event. The vertical line denotes the time of the adverse event.

Figure 18a  
Short-Run Effect of a First Contact, Successful Claims

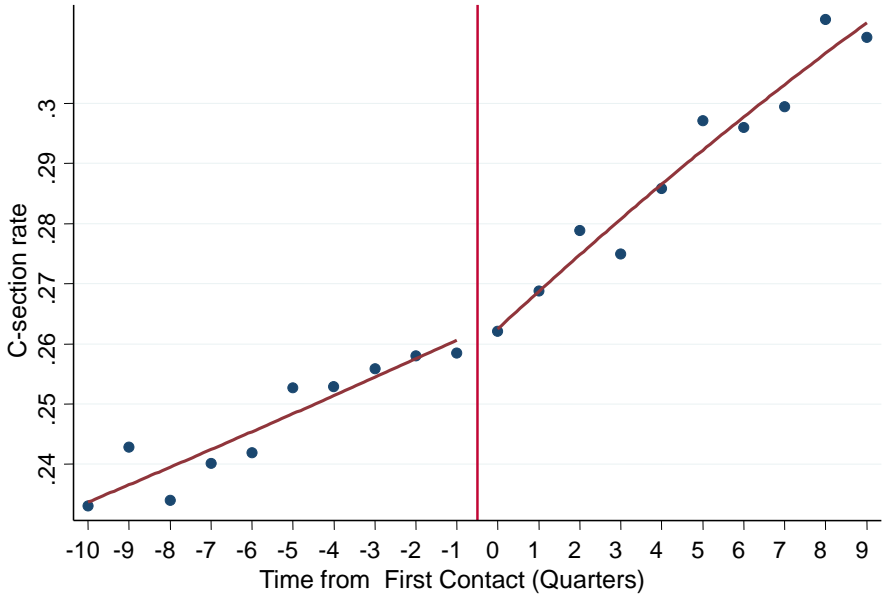
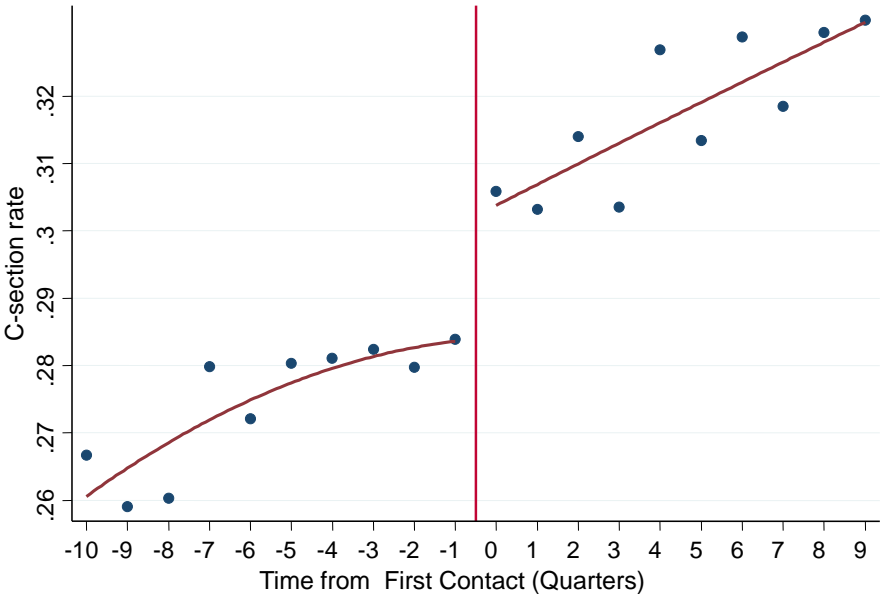
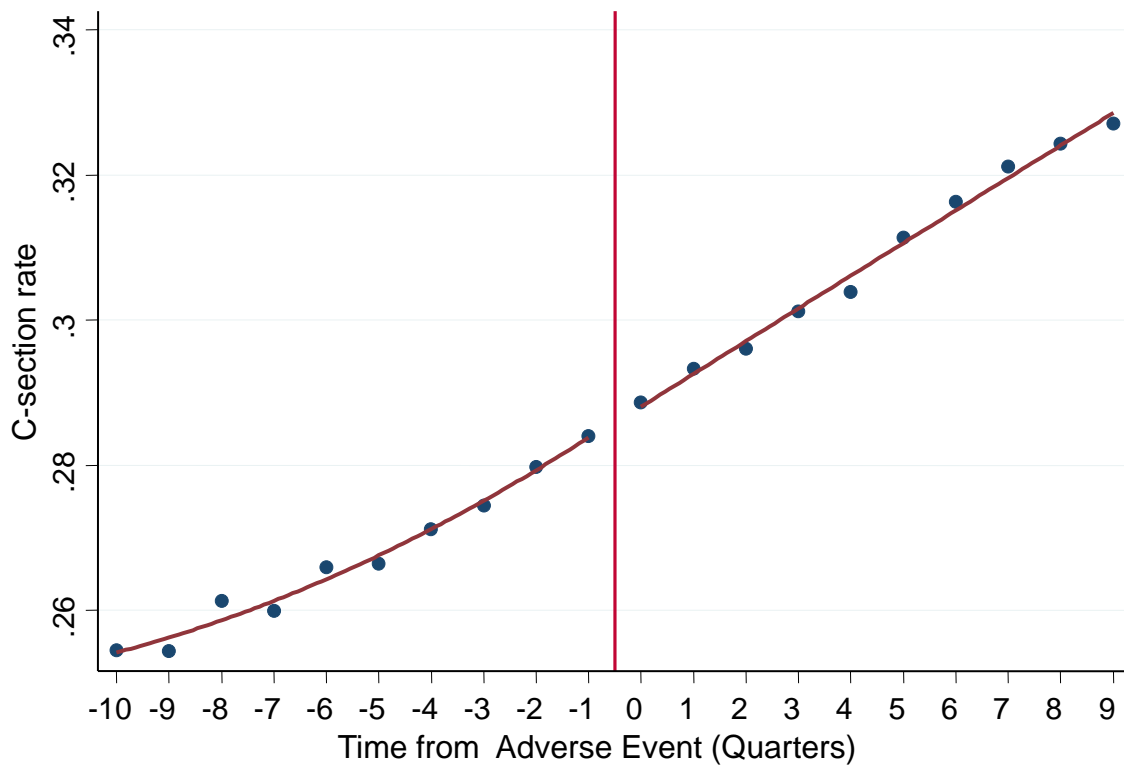


Figure 18b  
Short-Run Effect of a First Contact, Unsuccessful Claims



NOTE: Panels A and B of this figure depict per-period C-section rates for Paid and Non-Paid claims respectively, in the first contact panel for claims reported more than a year after the adverse event. The vertical red line denotes the time of the first contact.

Figure 19  
Short-Run Effect of an Adverse Event on Same-Hospital Peers



NOTE: The figure plots per period C-section rates in the peer panel, including all physicians who work at the same hospital as the treated physician and appear through the 5 year sample period. The vertical line denotes the time of the adverse event.

Figure 20a  
Short-Run Effect of an Adverse Event on Same-Hospital Close Peers

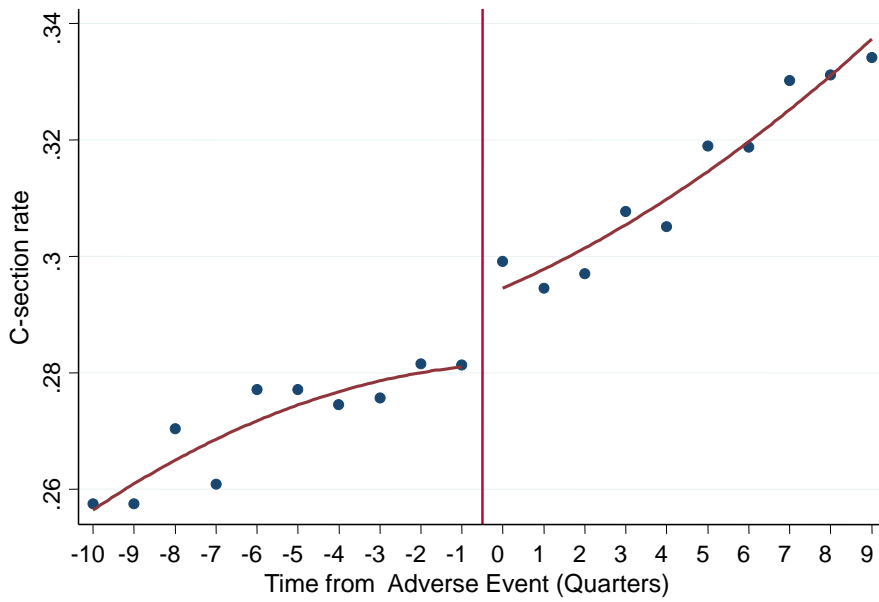
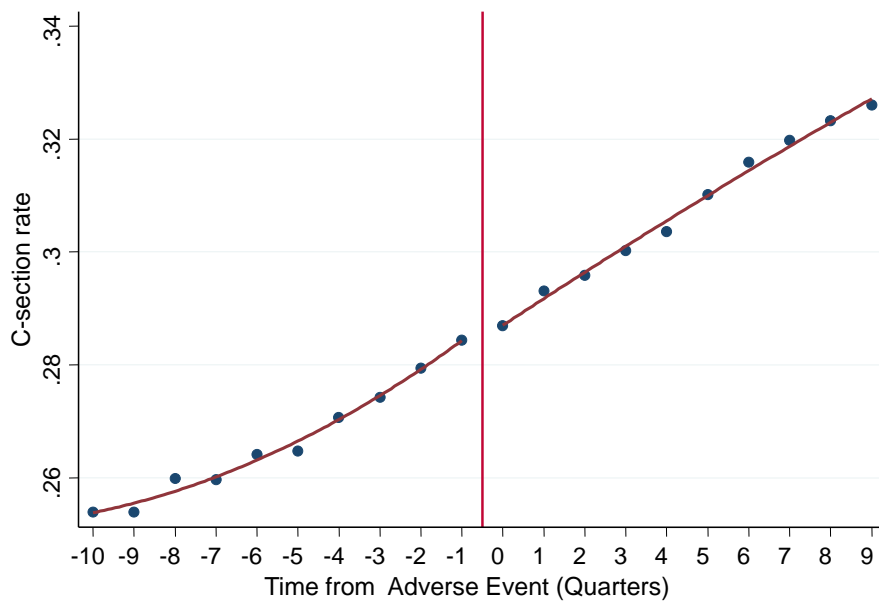


Figure 20b  
Short-Run Effect of an Adverse Event on Same-Hospital Remote Peers



NOTE: Panels A and B of this figure depict C-section rates for close and remote peers, respectively. Close peers are defined as peers from the same hospital who have at most 3 years gap in experience from the treated physician, who treat patients in nearby neighborhoods – at most 10 miles apart, and who treat patients of a similar socioeconomic status – at most 0.4 percentage points in share of pre-event Medicaid patients. The vertical red line denotes the time of the adverse event.