

THE IMPACT OF FAMILY LEAVE LAWS
ON CESAREAN DELIVERY

by

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ABSTRACT

Cesarean rates have increased dramatically since 1965, with nearly a third of all births being delivered by cesarean section in 2006. Although numerous factors have contributed to this increase, this paper estimates the impact of family leave laws on cesarean rates. Leave laws led to increased health insurance coverage, thus altering the financial incentives facing both parents and physicians in the choice of delivery method. The laws also changed leave taking by parents, which may have impacted cesarean rates. The impact of leave laws on cesarean rates is estimated using a difference-in-differences approach coupled with the variation in state leave laws that existed prior to the passage of the federal Family and Medical Leave Act (FMLA) in 1993. The empirical results suggest that state leave laws are associated with an 8 to 13 percentage point reduction in the probability of cesarean delivery, but that the FMLA had little impact on cesarean rates.

CHAPTER 1

INTRODUCTION

In 2006, nearly a third of all births in the United States were delivered by cesarean section. As shown in Figure 1 in Appendix A, cesarean rates have increased by nearly 600 percent since 1965, when a cesarean rate of 5 percent was first recorded by the National Center for Health Statistics (NHCS). This increasing trend shows no signs of stopping as cesarean rates have increased by more than 50 percent since 1996 alone. Medical authorities such as the American College of Obstetricians and Gynecologists (ACOG) and the National Institutes of Health (NIH) have voiced concern about the high and increasing rate of cesarean delivery in the United States, particularly because there is not conclusive evidence that cesarean delivery promotes the health of the mother and child over vaginal delivery (ACOG 2000; NIH 1981).

A portion of the increase in cesarean rates can be explained by increased maternal age, multiple births, rates of obesity and diabetes among mothers, changes in physician training, advances in technology, and changes in the financial incentives facing physicians. However, research has been unable to account for all of the factors contributing to the rise in cesarean rates. This paper seeks to identify whether the passage of family leave laws at both the state and federal levels impacted cesarean delivery rates by altering the incentives and constraints facing physicians and mothers.

Previous research suggests that physicians and mothers are sensitive to insurance coverage in their decisions regarding method of delivery, with cesarean rates highest

among privately insured patients, followed by those on Medicaid and the uninsured (Grant 2005; Gruber et al. 1999; Keppel et al. 1982; Stafford 1990b, 1991). Thus, the increased insurance coverage mandated by some of the state laws and the FMLA could be a factor associated with increased cesarean rates.

In addition, the laws granted increased access to and length of leave for parents, which may increase cesarean rates if parents utilize leave for the longer recovery from cesarean. Alternatively, increased access to leave could decrease cesarean rates if the laws lead to more women taking leave prior to the birth, thus making them in some way healthier (i.e., lower levels of stress, lower blood pressure, less time on their feet, etc.) and less likely to deliver by cesarean. Prior to the passage of the leave laws, employers that offered maternity leave often granted extra leave for cesarean delivery (typically eight instead of six weeks of leave) to accommodate the longer recovery period. Therefore, cesarean rates may have decreased if the leave laws eliminated this additional time-off granted for cesarean delivery.

Prior to the passage of the federal Family and Medical Leave Act (FMLA) in 1993, a number of states passed leave laws granting parents time off of work for the birth of a child. To estimate the impact of leave laws on cesarean rates, a quasi-experimental framework is used, in which the change in cesarean rates among the women in states that passed these laws is examined relative to the change in cesarean rates among the women in the states that did not pass leave laws prior to the passage of the FMLA.

If family leave laws impacted cesarean rates, the change in cesarean rates should be larger in states that passed leave laws. A "reverse experiment" can also be performed

by comparing the change in cesarean rates after the FMLA was passed in states that did not pass leave laws relative to states that passed these laws before the FMLA took effect.

The empirical results suggest that state leave laws are associated with a decreased likelihood of delivery by cesarean section but that the FMLA had little impact on cesarean delivery. For children born before the federal FMLA took effect, it is estimated that the probability of cesarean delivery is between 8 and 35 percentage points lower in states that passed leave laws relative to states without such laws. This finding is robust across various specifications and samples.

The paper proceeds as follows. Chapters 2 and 3 provide background information on cesarean rates, as well as information on state and federal family leave laws. Chapter 4 reviews the literature on: i) the factors that have contributed to the trend in cesarean rates, ii) the economic incentives surrounding cesarean delivery, iii) the impact of leave laws on leave taking, and iv) how recovery differs between cesarean and vaginal delivery. The economic theory relating to this topic is explored in Chapter 5. The empirical methodology and data are outlined in Chapters 6 and 7. The empirical results and discussion are presented in Chapter 8, followed by concluding remarks in Chapter 9.

CHAPTER 2

TRENDS IN CESAREAN RATES

Cesarean section rates in the United States remained fairly stable until the 1970s, at which point, rates began increasing dramatically.¹ The total cesarean rate, which is the percentage of all births delivered by cesarean section, increased from the 1970s through the 1980s and then declined from 1989 to 1996. As shown in Figure 1, rates began climbing again after 1996 and have not stopped increasing since that time. Underlying the total cesarean section rate are the primary cesarean rate and the repeat cesarean rate.²

Rates of primary cesarean sections have followed a trend similar to that of the total cesarean rate. Repeat rates followed an increasing trend from the 1970s to 1992, at which point they began declining until 1996 when they started increasing again. The decline in repeat rates from 1992 to 1996 contributed to the overall decline in cesarean rates during this period. In 2004, the repeat rate was at 38 percent.

In the 1980s and 1990s, vaginal birth after cesarean delivery (VBAC),³ instead of repeat cesarean, was actually encouraged in federal reports by the NIH and U.S.

¹ Among 26 OECD countries in 2004, the United States ranked fourth in terms of cesarean rates with a rate of 29 percent (See Table 1 in Appendix A). Mexico, Italy, and Korea had higher cesarean rates than the United States (OECD 2007). The average cesarean rate among Latin American and Caribbean countries was estimated at 26 percent, and the cesarean rate in East Asia was estimated at 26 percent in 2006. The estimated cesarean rates among other developing countries were much lower than the rates for Latin American and Caribbean countries and East Asia. The average cesarean rate for the developing world was estimated at 12 percent (Stanton and Hotz 2006).

² The primary cesarean rate is the number of cesarean deliveries among mothers who have not previously delivered by cesarean section divided by the sum of the number of primary cesareans and the number of vaginal births. The repeat cesarean rate is the number of cesarean deliveries to women who previously had a cesarean divided by the number of vaginal births after previous cesarean (VBAC) plus the number of repeat cesareans.

³ The VBAC rate is the number of births delivered vaginally after a mother has delivered a previous pregnancy by cesarean divided by the sum of the number of VBAC's and the number of repeat cesareans.

Department of Health and Human Services (DHHS) and the ACOG (NIH 1981; DHHS 1990; ACOG 1994, 1995). However, in 1999, the ACOG adopted more restrictive recommendations regarding VBAC, recommending that women attempt a vaginal delivery after having had a previous cesarean only if the hospital is equipped to perform an emergency cesarean in the event of uterine rupture (ACOG 1999). This change in recommendation appears to be the result of safety and legal concerns (Zweifler et al. 2006). The combination of the trends in primary, repeat, and VBAC rates together has resulted in an increase in the total cesarean rate since 1996.⁴

⁴ Both the DHHS and the World Health Organization (WHO) recommend a cesarean rate of 15 percent for low-risk women because there is little evidence that maternal and infant health are improved when cesarean rates exceed this target rate (DHHS 1990, 2000; WHO 1985, 1994). A low-risk female is defined as one with a full-term (at least 37 weeks) singleton (not a multiple pregnancy) vertex fetus (head facing in a downward position in the birth canal). In 2003, the cesarean rate among low-risk women was 24 percent, compared to 28 percent for all women (NCHS 2005).

CHAPTER 3

STATE AND FEDERAL LEAVE LAWS

Prior to the passage of the federal FMLA in 1993, a number of states passed laws granting leave for pregnancy and childbirth, with Massachusetts being the first state to pass a maternity leave law in 1972. Table 2 in Appendix A provides details on the laws passed in each state. For example in 1980, California passed a law granting female employees in either the public or private sector four months of leave for maternity disability.⁵ In 1992, California expanded the law to allow both mothers and fathers to take up to four months of leave to care for a newborn and also required that insurance coverage continue during the leave at the employee's expense.

At the time the FMLA was passed, 22 states had some form of a law granting time off work for maternity disability, maternity leave, or parental leave for private sector employees.⁶ A number of states passed leave laws that applied only to public sector employees, but for the purposes of this paper, the states that passed leave laws allowing private sector employees to take leave are of primary interest. Some states (i.e., KS and MT) passed laws requiring that employers grant a "reasonable period" of leave for maternity disability, while others (i.e., IA and TN) passed laws specifying the number of weeks of leave to be granted and allowing leave to be taken not only to recover from childbirth, but also to care for the newborn. The majority of the state laws were passed in

⁵ Maternity disability refers to physical disability due to pregnancy, miscarriage, childbirth, or recovery that substantially limits work activities.

⁶ Maternity leave refers to leave granted to female employees for the birth and care of a new baby. Parental leave refers to leave granted to both male and female employees for the birth and care of a new baby.

the 1980s, particularly from 1987 onward. Some states (i.e., MA and TN) allowed only maternity leave, while others (i.e., ME and MN) also allowed fathers to take leave for the birth of a child.

The state laws varied with respect to whether they required that health insurance coverage continue during the leave. Prior to the FMLA, a total of nine states passed leave laws that required that health insurance coverage continue during the leave, with Minnesota, Rhode Island, and Tennessee being the first states to pass such laws. The state laws also varied in terms of employee eligibility requirements, such as firm size, job tenure, and hours worked in the previous year. The majority of leave provisions were unpaid, although, a few states required payment to employees on leave through temporary disability insurance. All of the leave laws examined in this paper provided job-protected leave, guaranteeing the employee his or her job back at the end of the leave period.

Shown at the end of Table 2 is the FMLA, which was signed into law in February of 1993 and took effect in August of 1993. The FMLA requires private employers with 50 or more employees and all public employers to grant 12-weeks of job-protected, unpaid leave in a 12-month period to qualifying employees to care for a newborn or newly-adopted child or for a seriously ill child, spouse, or parent, or to recover from their own serious health conditions. Employees qualify for the leave if they worked for their employer for at least 12-months and worked at least 1,250 hours for their employer in the previous 12-months. The FMLA also requires that employers continue health insurance coverage through the leave period.

Table 3 in Appendix A provides a summary of the various state law specifications that were used in the empirical analysis and lists the year each state passed the relevant leave law. Column 1 specifies the states that passed any form of a leave law covering private sector employees, which include leave laws for maternity disability, maternity leave, and/or parental leave (any law). Column 2 identifies the states that passed leave laws that specified the length of leave to be granted (i.e., the number of weeks of leave was specifically addressed in the law and did not require only a "reasonable period of leave") covering private sector employees (leave law).

Column 3 lists states that passed a leave law covering the private sector that both specified the number of weeks to be granted *and* required that insurance coverage continue through the period of leave (insure law). Column 4 lists the states that passed parental leave laws (i.e., both males and females are eligible to take leave to care for an infant) that granted a specified number of weeks of leave to private sector employees (parent law). Column 5 lists the states that passed a law similar to the FMLA in that it granted a specified number of weeks of leave to private sector employees, required that health insurance coverage continue during leave, and granted parental leave (FMLA-like law). Finally, Column 6 lists the states that passed leave laws covering only public sector employees (public law). Some states passed laws covering the public sector first and then later extended coverage to the private sector, while other states, such as Georgia,

only passed a public sector law and never extended coverage to the private sector until the federal FMLA was passed.⁷

⁷ The FMLA allows states to have leave laws that are more generous than the FMLA, but the FMLA takes precedent over state laws that are less generous than the federal law. Therefore, the variations in state leave laws were prevalent primarily until the FMLA was passed in 1993.

CHAPTER 4

LITERATURE REVIEW

As discussed below, previous research offers indirect evidence that leave laws may have impacted cesarean rates, but no other studies have specifically explored the impact of leaves laws on cesarean rates. Evidence suggests that the passage of leave laws increased insurance coverage during leave periods, and research also supports the association between insurance coverage, fee reimbursement, and cesarean delivery. Other researchers have found that the leave laws increased access to leave, leave taking, and the length of leave, which may have impacted cesarean rates. However, the predicted impact of the change in leave taking on cesarean rates is ambiguous. The following sections more thoroughly explore the research that suggests that leave laws have an impact on cesarean rates in the United States.

Explaining the Trends in Cesarean Rates

Although this paper seeks to estimate the impact of leave laws on cesarean rates, various other factors also contributed to the increased rate of cesarean delivery. Researchers have attempted to explain the increase in rates by examining changes in clinical/medical factors, changes in maternal requests for cesarean delivery, and changes in financial incentives facing physicians.

Medical Factors

The medical determinants of cesarean delivery include multiple births, birth weight of the baby, underlying medical conditions of the mother (including overweight and obesity, diabetes, and hypertension), complications of pregnancy, age of the mother, and the number of previous pregnancies and births that the mother has experienced (Tussing and Wajtowycz 1992).

Many changes have occurred since the 1970s that help explain a portion of the increase in delivery by cesarean section. Use of technologies (such as fetal heart rate monitors) has increased dramatically, resulting in higher cesarean rates if fetal distress is suspected. The percentage of all deliveries with no reported complications fell from 70 percent in 1970 to 39 percent in 1984 (Shiono et al. 1987). Obstetrical training for delivery of babies in the breech position has also changed, shifting toward delivering breech babies by cesarean section rather than vaginally. In 1970, about 12 percent of babies in the breech position were delivered by cesarean section, while in 1984, 80 percent were delivered by cesarean (Shiono et al. 1987).

Maternal Requests

In addition to changes in medical factors, mothers have also begun requesting cesarean delivery more frequently. Although it is difficult to estimate rates of maternally requested cesarean delivery, research suggests maternal request for cesarean delivery is on the rise. Using data on whether labor was attempted and whether a medical indication was present, Meikle et al. (2005) find that U.S. rates of elective primary cesarean delivery increased from 20 percent in 1994 to 28 percent in 2001. This translates into

approximately 166,000 maternally requested cesarean deliveries in 1994 and 274,000 in 2001.⁸ These figures are consistent with international estimates by other researchers who find that 14 to 22 percent of all elective cesareans are maternally requested (Ryding 1991; Tranquilli and Garzetti 1997; Eftekhar and Steer 2000; Schindl et al. 2003; Kolas et al. 2003; Tranquilli and Giannubilo 2004; Wiklund et al. 2007).

With an estimated 28 percent of all cesarean deliveries in the United States being requested by the mother in 2001, some women clearly have a preference to deliver by cesarean (Mickle et al. 2005). Fear of childbirth, including the pain, labor, and uncertainty surrounding vaginal delivery are common reasons cited by women requesting cesarean delivery. The ability to schedule and plan the delivery in advance is also a commonly cited reason that mothers prefer cesarean delivery. Women who requested cesarean delivery also prefer cesarean delivery because it feels "safer" (McFarlin 2004; Miesnik and Reale 2007; Penna and Arulkumaran 2003; Feinman 2002).

Gruber and Owings (1996) hypothesize that cesarean rates may have increased in part due to the commonly held belief in the general population that cesarean delivery is safer for the infant. Between 1968 and 1983, the infant mortality rate was halved, while cesarean rates increased rapidly. Although a strong correlation exists between improvements in birth outcomes and increased rates of cesarean delivery, Marieskind (1979) cautions against interpreting this correlation to mean that the increased utilization of cesarean delivery *caused* the significant decline in infant mortality, as other technological advances occurred during this period such as neonatal intensive care units.

⁸ These estimates are calculated using the cesarean rates reported by the NCHS (2007a). The NCHS reports 830,517 cesarean deliveries in 1994 and 978,411 cesarean deliveries in 2001.

Although the evidence is not conclusive, a great deal of research has been done to assess the health risks and benefits of cesarean delivery. Some evidence suggests that cesarean delivery may have benefits over vaginal delivery. The NIH (2006) found weak to moderate evidence that planned cesarean delivery is associated with lower rates of urinary incontinence in the mother, lower maternal risk of hemorrhage, lower neonatal mortality, and lower rates of intracranial hemorrhage, neonatal asphyxia, encephalopathy, injury, and infection among the neonate, especially relative to assisted vaginal delivery (NIH 2006).⁹

However, other evidence suggests that vaginal delivery has benefits over cesarean delivery. Research finds that women delivering by cesarean experience greater blood loss, are more likely to require blood transfusions, are at higher risk of developing potentially life-threatening blood clots, and may face higher rates of complications due to anesthesia and increased risk of infection (Koroukian 2004; Penna and Arulkumaran 2003; Miesnik and Reale 2007; Mayo Clinic 2002; ACOG 2005; Hendersen and Love 1995; Lyndon-Rochelle et al. 2001; Liu et al. 2005; Koroukian 2004; DeClercq et al. 2007). The NIH concluded that insufficient evidence existed to determine whether maternal risk of mortality differed among mode of delivery, but other researchers found a higher risk of maternal mortality for cesarean delivery compared to vaginal delivery (Deneaux-Tharaux et al. 2006; Lilford et al. 1990; Hall 1994; Schuitemaker et al.

⁹ A planned cesarean means that the decision to deliver by cesarean section was made prior to the mother going into labor. A planned vaginal delivery means that prior to the mother going into labor, the anticipated method of delivery is a vaginal birth; however, planned vaginal deliveries may result in a normal vaginal delivery, an assisted vaginal delivery in which forceps or vacuum extraction are required, or an unplanned cesarean delivery after the mother has labored for some time.

1997).¹⁰ Research finds moderate evidence that respiratory complications are higher among infants delivered by cesarean section and that higher neonatal mortality is associated with cesarean delivery compared to vaginal delivery (NIH 2006; Miesnik and Reale 2007; Penna and Arulkumaran 2003; MacDorman et al. 2006). In sum, despite any popular perception of cesarean delivery as "safer," there is not conclusive evidence supporting one delivery method over the other.¹¹

Finally, coinciding with the increase in maternal request for cesarean, physicians have become more willing to perform the procedure at the request of their patients. A 1986 survey of obstetricians showed that 90 percent of them would not perform a requested cesarean section where no medical indication was present. More recently, however, researchers have estimated that 40 to 85 percent of physicians would perform a non-medically indicated cesarean requested by the mother (Bergholt et al. 2004; Bettes et al. 2007; Wax et al. 2005).¹²

Financial Incentives

Certain cases undoubtedly warrant the use of cesarean delivery. However, the decision to deliver vaginally or by cesarean is not clear-cut in many cases and is at the

¹⁰ It is important to note, however, that the maternal death rate in the United States in 2003 was about 12 per 100,000 live births, reflecting a low overall risk of death from pregnancy and childbirth (CDC 2007).

¹¹ The NIH stated that until more research is done on cesarean delivery on maternal request, any decision to perform such a procedure should be carefully individualized and consistent with ethical principles, and it is not recommended for women desiring to have several children or for pregnancies less than 39 weeks gestation (NIH 2006). In 2003, the ACOG recommended acceptance of non-medically indicated cesarean delivery as long as it promotes the overall health and welfare of the mother and fetus more than vaginal delivery (ACOG 2003). The International Federation of Gynecology and Obstetrics, The American College of Nurse Midwives, and The Association of Women's Health, Obstetrics, and Neonatal Nurses all oppose delivery by cesarean section when no medical indication is present (FIGO 1999; ACNM 2004; AWHONN News and Views 2006).

¹² Ghetti et al. (2004), however, surveyed physicians in Portland, Oregon and found much lower estimates of only 2 to 20 percent.

discretion of the physician. Financial incentives may be particularly influential when a physician is on the margin between the two delivery methods. Under the notion of "induced demand," physicians act as agents to uninformed patients and may over-utilize cesarean delivery to reap the financial rewards associated with the procedure (Tussing and Wajtowycz 1992; Gruber and Owings 1996).

Although research has produced mixed results, it is commonly cited that fear of malpractice suits among obstetricians is another financial factor contributing to the rise in cesarean rates. To minimize the risk of being sued in the event of a poor birth outcome, physicians may increasingly deliver by cesarean (Tussing and Wojtowycz 1992; Marieskind 1979).

Changes in insurance coverage and fee reimbursement by insurance companies have also been cited as contributing factors. Cesarean delivery generally costs more than vaginal delivery due to higher hospital and physician charges, with estimates ranging between \$2,850 and \$4,370 more for cesarean compared to vaginal delivery (Gardner 1995; HIAA 1989; Currie and MacLeod 2008; Mushinski 1993, 1996).¹³ Hospital costs also differ between the two delivery methods, stemming largely from the longer hospital stay associated with cesarean delivery. For planned cesarean, the average length of stay is 4.3 versus 2.4 days for vaginal delivery (Declercq et al. 2007).

The difference in fees between vaginal and cesarean delivery is an important incentive facing the physician and mother in the delivery decision. Just as important as the difference in fees are the incentives surrounding health insurance coverage and

¹³ Alternatively, some researchers have found vaginal delivery to be more expensive, particularly if induction, augmentation, or epidural anesthesia is utilized during labor (Bost 2003; Allen et al. 2005; Palencia et al. 2006).

cesarean delivery. A sizable body of literature has documented the relationship between payment source and cesarean section rates. The reimbursement differential between cesarean and vaginal delivery is generally higher among private insurance companies than among public insurers. In 1989, the average fee differential paid to physicians between vaginal and cesarean delivery was \$561 among the privately insured, \$127 among those covered by Medicaid, and near zero for the uninsured due to the high probability that the bill will not be paid regardless of the delivery method (Gruber et al. 1999).¹⁴

Researchers have found that even after adjusting for the health of the mother and birth complications, cesarean rates are highest among privately insured patients, followed by patients with public insurance, and lowest among the uninsured (Grant 2005; Gruber et al. 1999; Keppel et al. 1982; Stafford 1990b, 1991; Keeler and Brodie 1993). Gruber et al. (1999) and Hass et al. (1993) find that larger fee differentials paid by Medicaid result in higher cesarean rates and that one-half to three-quarters of the difference in cesarean rates among privately insured versus Medicaid patients can be explained by the lower fee differential paid by Medicaid.

Finally, Das (2002) attributes approximately 30 percent of the decline in cesarean rates between 1989 and 1996 to increased market share of HMO's, as HMO's reimbursement rates are generally lower than private insurance. Grant (2005), however, finds that privately insured mothers receive more cesarean sections primarily because these women are disproportionately paired with physicians who are more likely to

¹⁴ Given that 80 percent of total charges to uninsured patients remain unpaid and that pregnancy and childbirth cases account for the largest proportion of unpaid care, the fee differential among uninsured patients is negligible (Epstein and Weissman 1989; Zollinger et al. 1991).

perform cesarean delivery and also because these mothers have a closer relationship with their physicians than do the non-privately insured.

Leave Laws and Insurance

The continuation of health insurance coverage during the leave period is important because it alters the financial incentives facing both the physician and mother. Not only are physicians more highly compensated for cesarean delivery for privately insured patients, coverage by health insurance is also paramount to the mother, as she bears only a small portion of the additional fees associated with cesarean delivery if she has health insurance coverage.

The Federal Commission on Family and Medical Leave prepared a report for Congress in 1996 on the impact of the FMLA on employers and employees. Although this report focuses specifically on the FMLA, it offers suggestive evidence of the potential impact of the state leave laws on employers and employees. The number of firms offering continuation of health insurance benefits during the leave period did increase as a result of the FMLA. Following the passage of the FMLA, 53 percent of firms reported that they changed their family and medical leave policies to allow for the continuation of health insurance benefits during an employee's leave. Of the firms covered by the FMLA, 96 percent continued health benefits when leave was taken to care for a newborn and 96 percent continued health benefits when leave was taken for maternity disability.¹⁵ Of the firms not covered by the FMLA, only 73 percent continued

¹⁵ The fact that this statistic is not 100 percent reflects non-compliance among employers and the fact that some employees do not meet the eligibility requirements of the FMLA.

health benefits when leave was taken to care for a newborn and only 86 percent continued health benefits when leave was taken for maternity disability. These statistics offer evidence that the passage of leave laws increased health insurance coverage for employees during periods of leave for childbirth and the care of a newborn.

The evidence provided here suggests that the continuation of health insurance coverage during the leave period required by some of the state leave laws and the FMLA, coupled with the financial incentives facing physicians and mothers as described above, may have generated increased cesarean rates.

Leave Laws and Leave Taking

Considerable research has been done to estimate the impact of the federal FMLA on leave taking. Although less research has specifically focused on individual states' leave laws, the estimates found for the FMLA serve as a proxy measure of how state leave laws impacted leave taking. Following the passage of the FMLA in 1993, the number of employees with access to family leave coverage increased sharply. In 1991, only 39 percent of full-time employees in medium to large firms (those firms covered by the FMLA) reported having maternity leave coverage. That number increased to 63 percent in 1993 when the FMLA was passed and to 95 percent by 1997. A similar trend is witnessed for paternity leave (BLS 1996, 1998).

The Commission on Family and Medical Leave (1996) found that while only 11 percent of private firms were covered by the FMLA,¹⁶ 60 percent of all private-sector workers were employed by these firms. Overall, 47 percent of all private-sector workers

¹⁶ All public sector firms are covered by the FMLA without regard to the number of employees on site.

met the eligibility requirements of the FMLA. Two-thirds of firms changed their leave policies following the passage of the FMLA, altering policies so that leave could be taken for a longer period of time, to include a job-guarantee following the leave, and to allow for paternity leave.

The literature on how leave laws impacted the incidence of leave taking and the length of leave has produced mixed results. Some researchers have found that the passage of leave laws led to increased leave taking, taking longer leaves, and increased likelihood of returning to the pre-birth employer (Waldfogel 1998, Berger and Waldfogel 2004; Han et al. 2007; Ross 1998; Glass and Riley 1998). Alternatively, Bond et al. (1991) examined the impact of state leave laws in Minnesota, Rhode Island, Oregon, and Wisconsin, and found that leave laws did not significantly impact leave taking among mothers but did lead to more fathers taking leave. Klerman and Leibowitz (1997) and Baum (2003b), however, find the maternity leave laws did not have a statistically significant impact on leave taking among mothers, but Baum (2003b) did find that maternity leave laws resulted in longer periods of leave for mothers.

Leave and Recovery from Cesarean Delivery

A number of researchers have examined the difference in recovery from cesarean versus vaginal delivery. Researchers comparing the recovery times between the two delivery methods generally find worse functional status among the mothers who underwent cesarean delivery at three weeks postpartum.¹⁷ Beyond three weeks

¹⁷ The functional status of the mother includes physical functioning, mental health, energy levels, the ability to perform infant care and household tasks, and involvement in social activities.

postpartum, however, some researchers found no difference in functional status between the two delivery methods (Tullman et al. 1990; DiMatteo et al. 1996), while others found differences that persisted until at least five to seven weeks postpartum (Tullman and Fawcett 1988; Lydon-Rochelle et al. 2001; McGovern et al. 2006, 2007).

With regard to return to work, Gjerdingen et al. (1991) find that vaginal delivery is associated with greater readiness to work at two months postpartum compared to cesarean delivery, but DiMatteo (1996) and Tullman and Fawcett (1988) report no differences in time to return to work between the two delivery methods.

The evidence suggests that recovery from cesarean delivery takes longer than for vaginal delivery and that this difference in recovery time persists until at least three weeks postpartum, but shrinks considerably within two months of giving birth. Given the longer recovery time needed with cesarean delivery, leave laws may have increased cesarean rates if women became more likely to prefer cesarean because they were guaranteed more time off of work to recover.

Summary

The previous discussion provides a review of the literature related to factors contributing to the increased use of cesarean delivery, as well as the link between leave laws and cesarean rates. Previous research provides evidence that the passage of leave laws led to increased health insurance coverage and altered the leave taking behavior of mothers and fathers. Thus, leave laws changed the incentives facing physicians and mothers. The economic theory behind this assertion is explored in the following section.

CHAPTER 5

ECONOMIC THEORY

Beginning with Arrow's (1963) work, the agency relationship that exists between physicians and patients has been a popular topic within the health economics literature. It is generally assumed that the standard economic model of utility maximization applies to the physician and patient; however, the agency relationship that exists between these two economic players presents a possible information problem that alters the economic incentives involved. An underlying assumption to this model is that physicians act as agents to uninformed patients. To the extent that this model holds true, the physician may have an incentive to "induce demand" for his services since he both diagnoses and recommends treatment. Inducement can best be defined as providing care for which the marginal costs outweigh the marginal benefits from the patient's perspective. However, in this model, the uninformed patient lacks clear knowledge of the associated costs and benefits and must base decisions on the physician's diagnosis and treatment advice (Dranove 1988; Fuchs 1978; Gruber and Owings 1996).

The Physician

Physicians are assumed to have utility functions that depend upon their level of income, leisure, and delivering the "appropriate" amount of care, subject to time and budget constraints. Delivery of the "appropriate" amount of care enters the utility function through the physician's internal conscience, a reputation process, or fear of being

sued. To the extent that the physician deviates from the "appropriate" amount of care, which in the case of childbirth may take the form of utilizing more lucrative treatment styles such as cesarean delivery, he may acquire a reputation of providing improper levels of care and lose future patients or face a lawsuit. Although the theoretical predictions regarding inducement are important to consider, empirical evidence has both supported and refuted this hypothesis (Gruber and Owings 1996; Kim 2007; Higgins 1985; Goldfarb 1985; Rock 1988).

In this context, one channel through which leave laws may impact physicians' incentives is through the requirement that health insurance coverage continue through the leave period. With more mothers covered by private insurance after the passage of the leave laws, physicians may have responded by performing more cesareans on women who would have been uninsured or insured by a less generous insurance plan without the passage of these laws. As mentioned above, physicians appear to be more likely to perform cesareans on privately insured women, likely due to the higher fee differential paid by private insurance compared to other types of insurance or the uninsured (Grant 2005; Gruber et al. 1999; Haas et al. 1993; Keppel et al. 1982; Keeler and Brodie 1993; Stafford 1990b, 1991).

However, it is not necessarily the case that increased use of cesarean delivery is not in the patient's best interest. Increased insurance coverage that leads to a higher rate of cesarean delivery may actually be welfare enhancing. If this higher rate of cesarean delivery is optimal, then physicians responding to insurance incentives may actually be improving the welfare of the mother and child.

Even if physicians are not over-utilizing cesarean delivery for income enhancement, there are other incentives that may be impacting their behavior. Planned cesarean delivery is more convenient from the physician's perspective because it takes less time and can be scheduled in advance. Research suggests that the workload in terms of intensity and time for vaginal delivery is actually higher than for cesarean. Physicians may also have incentives to deliver by cesarean in cases where labor is taking a long time or extending into the night (Evans et al. 1984; Phillips et al. 1982; Fraser et al. 1987; Penna and Arulkumaran 2003; Keeler and Brodie 1993).

The Mother

Using Becker (1965) and Grossman's (1972) work as a foundation, the mother's utility is a function of family income, leisure, her own health, and her baby's health, subject to time and budget constraints. Although the physician has the final say in whether a cesarean is performed, the mother can select a physician whose practice style closely matches her preferences, and she can also impact the physician's decision by expressing her preferred method of delivery.

Several important incentives affect the mother's inclination for a particular delivery method. With cesarean delivery costing, on average, several thousand dollars more than an uncomplicated vaginal delivery, the fee differential between cesarean and vaginal delivery is an important factor for the mother. This fee differential is particularly important to uninsured women. In 1985, only 11 percent of the total charges for maternity care were paid out-of-pocket by the mother. In addition, the extra expense of a

cesarean delivery over a vaginal delivery to an insured mother is even smaller since the charges for a vaginal delivery generally meet the out-of-pocket maximums of the typical policy (Gold et al. 1987; Keeler and Brodie 1993).

In addition to financial considerations, cesarean delivery can be planned in advance and scheduled for a convenient time and date. Vaginal delivery can also be scheduled if labor is induced through the use of medication. Indeed, the NCHS (2007a) reports that rates of induction of labor have increased from 10 percent in 1990 to 23 percent in 2005, a 138 percent increase. Luthy et al. (2004) and Heffner et al. (2003) find that induction of labor increases the risk of cesarean delivery in nulliparous women by about 70 percent and in multiparous women by about 50 percent. Thus, cesarean rates may have been indirectly impacted if leave availability and health insurance coverage also impact induction rates.

With the passage of leave laws, women may have become more likely to prefer, or at least not oppose, cesarean delivery because they were guaranteed time off of work to accommodate the longer recovery period required for cesarean. Physicians may also have become more inclined to perform cesareans on women eligible for leave, knowing that these women had leave to accommodate the longer recovery.

Conversely, cesarean rates may have been negatively impacted by the increased leave taking and length of leave taken following the passage of the leave laws. A decline in cesarean rates is plausible if women increased their taking of leave *prior to* the birth and as a result, are in some way healthier and less likely to require a cesarean. For example, a woman who begins her leave the week prior to her due date may be less

stressed, have lower blood pressure, and spend less time on her feet than if she had otherwise not taken the week off before her due date. Thus, she may have become less likely to require a cesarean because she had access to leave.

Mothers may have also become less likely to prefer cesarean delivery if they no longer stand to gain additional time off of work if they have a cesarean compared to a vaginal delivery. Before the leave laws were passed, employers that made maternity leave available to employees often granted six weeks of leave for vaginal and eight weeks of leave for cesarean delivery (Riley 2006). Thus, if the leave laws eliminated this "bonus" time off of work and resulted in the same amount of leave regardless of delivery method, mothers may have become less likely to prefer cesarean delivery.

Summary

The basic premise underlying the hypothesis of this paper is that the decision to deliver by cesarean is sensitive to the incentives facing both the physician and the mother. Economic theory assumes that both the physician and mother seek to maximize utility. For the physician, the requirement that health insurance continue during leave is a key factor in examining how the physician's decision to deliver by cesarean or vaginally is impacted by leave laws. The continuation of health benefits as well as changes in leave taking by the mother and father following the birth are the key factors in assessing the impact of leave laws on the mother's desire to deliver by cesarean or vaginally. Economic theory supports that assertion that leave laws may have impacted cesarean

rates by altering the opportunity cost of cesarean delivery. The following sections discuss the empirical strategy used to test the economic theory.

CHAPTER 6

EMPIRICAL METHODOLOGY

To estimate the impact of leave laws on cesarean rates, the variation in state leave laws is utilized. The first analysis estimates the impact of state leave laws on cesarean rates by examining only births before 1993. The second analysis examines births between 1979 and 2000 to estimate the impact the federal FMLA on cesarean rates.

Probit regressions are estimated, with the basic econometric model being of the form:

$$\text{CSECT}_{ijt} = f(\alpha + \beta_1 X_{ijt} + \beta_2 Z_{ijt} + \beta_3 L_{ijt} + \beta_4 S_j + \beta_5 T_t + \varepsilon_{ijt}), \quad (1)$$

CSECT is equal to one if child i was delivered by cesarean section in year t in state j , and zero otherwise,

X is a set of individual demographic and health characteristics of the mother,

Z is a set of individual demographic and health characteristics of the child,

L is equal to one if the child was born in a state and year when a leave law was in effect, and zero otherwise,

S is a full set of state indicator variables,

T is a full set of year indicator variables, and

ε is an error term.

Variables in X include the Armed Forces Qualification Test (AFQT) score of the mother,¹⁸ the age of the mother at the birth, the race of the mother, the education level of

¹⁸ The AFQT percentile score (scores range from 1 to 99) is a measure of intelligence and was measured in 1989 for the NLSY survey respondents.

the mother at the time of the birth, the body mass index of the mother before and after delivery, and indicators for whether or not the mother had a previous cesarean delivery, and whether or not the mother received prenatal care in the first three months of pregnancy.

In some specifications, X also includes the mother's occupation and industry in the birth year, the mother's earnings in the fourth quarter before the birth, total family and spousal income in the birth year,¹⁹ the number of hours the mother worked per week in the fourth quarter before the birth of the child, and indicators for whether or not the mother's wages were set by a collective bargaining unit, whether or not the mother's health limited the kind of work she could perform, the mother's marital status in the birth year, whether or not the father of the child was present in the household in the birth year, and whether or not the mother's employer offered health insurance.

Variables in Z include: the length and weight of the child at birth, an indicator for whether the child was born low birth weight (less than 5.5 pounds), and weeks of gestation of the child at delivery.

In the pre-FMLA analysis, the variable L indicates whether or not the child was born in a state that had a leave law in effect at the time of birth. L is equal to one if the child is born in a year and state where a leave law is in effect and zero otherwise.

Separate probit regressions are estimated for each of the law specifications in Columns 1 through 5 of Table 3 to estimate the impact of each type of leave law on the probability of

¹⁹ Since the NLSY surveys women from 1979 through 2004, all dollar values were put in terms of 2004 dollars. The relevant variables that were adjusted to 2004 dollars include family income in the birth year, spousal income in the birth year, and the mother's earning in the fourth quarter before the birth of the child. The earnings and income variables are divided by 1,000 in order to scale them.

cesarean delivery. A separate regression is not estimated for the law specification in Column 6, but instead, the public law variable is included in all regressions to control for whether the state passed a leave law covering only the public sector prior to passing a leave law covering the private sector.

Finally, the vectors S and T represent full sets of state and year indicator variables that are included in all regressions. The state indicator variables control for any permanent differences among states that may impact both the probability of cesarean delivery and the existence of a leave law in the state. The year indicator variables control for time trends in cesarean rates that may impact both the probability of cesarean delivery and the existence of a leave law in the state, as both cesarean rates and the passage of leave laws exhibit strong time trends. The standard errors are corrected for heteroskedasticity and are clustered on state of birth.²⁰

In the pre-FMLA analysis, the impact of the state leave laws on cesarean rates can be estimated using β_3 , which captures the variation in state leave laws that existed prior to the passage of the FMLA to compare the change in the probability that a baby is delivered by cesarean in states that passed leave laws (the "treatment states") to the change in the probability that a baby is delivered by cesarean in states that did not pass leave laws (the "comparison states"). β_3 is the coefficient on the L term in regression equation (1). For the pre-FMLA analysis, β_3 will be positive if the increase in the probability of cesarean delivery in states that passed leave laws is larger than the increase in the probability of cesarean delivery in the states that did not pass the laws, but β_3 will

²⁰ For an explanation of the cluster command and its uses, see: Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. "How Much Should We Trust Differences-in-Differences Estimates?" *The Quarterly Journal of Economics*, 2004, 119, pp. 249-275.

be negative if the leave laws are associated with a decreased probability of cesarean delivery.

Using the entire sample of births from 1979 to 2000, the impact of the federal FMLA can be estimated by comparing the change in the probability of cesarean delivery in states that did not pass leave laws before the federal law was passed to the change in the probability of cesarean in states that already had "FMLA-like" laws in place. In this case, L equals one for births after 1993 in states that had no form of private sector leave law before the federal FMLA was passed (the "treatment group"). These are compared to births after 1993 in states that already had "FMLA-like" laws in place prior to the passage of the federal law as well as all births before 1993 (the "comparison group"), for which L equals zero. β_3 will be positive if births in states that had no form of leave law experience a larger increase in the probability of cesarean relative to the comparison group, but will be negative if the FMLA is associated with decreased likelihood of cesarean delivery for the treatment group.

CHAPTER 7

DATA

In addition to the law data documented in Tables 2 and 3, the data for this paper come primarily from the National Longitudinal Survey of Youth (NLSY).²¹ The NLSY is a nationally representative sample that began in 1979. At the onset of the survey, respondents were between the ages of 14 and 21. Respondents were interviewed annually from 1979 to 1994, after which point interviews were conducted biennially. The NLSY contains data on labor force, demographic, and health characteristics of the mother. The NLSY also has data on the children born to the NLSY women. For each child, detailed information about the birth was recorded, including whether the child was delivered by cesarean. The sample of children used in this paper was born between 1979 and 2000.

The public-use NLSY data is supplemented with the NLSY Geocode data, which allows the state of birth to be identified. It is important to note that the NLSY is a sample of a particular cohort of women and may not represent the impact of leave laws on other cohorts of women.²² The sample is limited to women working in either the private or

²¹ The original NLSY sample contained 6,283 women, with an oversample of blacks, Hispanics, low-income whites, and military personnel. The military sample was dropped in 1984, and the low-income white sample was dropped in 1990, leaving 4,510 female respondents in 1990. As of 1986, 5,255 children had been born to the female respondents, and that number increased to 8,267 by 2004.

²² The majority of the states that passed leave legislation did so during the period ranging from the late 1980s through the early part of the 1990s. In 1990, approximately half-way through this period, the NLSY respondents were between the ages of 25 and 32. It should be noted that this sample represents a particular cohort of women may be representative of all mothers and births occurring during this period.

public sectors in the fourth quarter before the birth of the child (Pre-FMLA N=3,082; Entire Sample N=3,429).^{23, 24}

Some of the control variables (for example, variables relating to employment and income) were not available for a large proportion of the NLSY respondents in each year.²⁵ Because such variables may be related to cesarean delivery and to state-by-year characteristics (such as the law variables), in some specifications, the sample is limited to women for which this information is observed.²⁶ In the pre-FMLA period, this reduces the base sample from 3,082 to 486. When the entire sample period from 1979 to 2000 is examined, this reduces the base sample from 3,429 to 625.

The descriptive statistics for the pre-FMLA sample are presented in columns 1 and 3 of Table 4. Twenty-four percent of births in the base sample were delivered by cesarean section, compared to 30 percent for the small sample. The small sample has a higher mean AFQT score and is more educated, with 34 percent having a bachelor's degree or higher, compared to only 19 percent of the base sample. The mean age of the mother at the time of the birth is also higher for the small sample compared to the base sample. The rate of HMO enrollment in the state of birth is higher among the small sample relative to the base sample.

²³ The fourth quarter before the birth of the child is the 13-week period at the beginning of the year preceding the birth of the child. For example, if a child was born on March 15, 1985, the fourth quarter before the birth would include the 13-week period starting March 15, 1984 and continuing to June 14, 1984.

²⁴ Women who reported working for a family business or for no pay in the fourth quarter before the birth of the child were dropped from the sample.

²⁵ Because the respondents were not interviewed in every quarter, variables relating to employment and income in the quarters before and after the birth of the child are missing for some of the respondents.

²⁶ This sample is referred to as the "Small Sample."

The descriptive statistics for the births during the entire sample period, including before and after the FMLA was passed, are presented in Table 5 in Appendix A. The mean cesarean rates for the large and small samples are 25 and 30 percent, respectively. Other notable differences include a higher mean AFQT score, higher mean age of the mother, and higher educational attainment for the small sample compared to the large sample.²⁷

²⁷ One might be concerned about different time trends in cesarean rates for states with and without leave laws. However, as shown in Figure 2 in Appendix A, this does not appear to be the case.

CHAPTER 8

EMPIRICAL RESULTS AND DISCUSSION

Impact of State Leave Laws

In the pre-FMLA period, separate probit regressions for each of the five law specifications are estimated using equation (1). The results are presented in Table 6 in Appendix A. For both the large (1) and small (2) samples, the results suggest that the probability of cesarean delivery is *lower* in states that passed any form of a leave and in states that passed a leave law granting a specified number of weeks of leave.

The estimated coefficients for the control variables are presented in Table 4 in Appendix A. Previous cesarean delivery is a strong predictor of current cesarean delivery. The probability of cesarean delivery declines for higher order births. The probability of cesarean increases for multiple births (i.e., twins or triplets), children born low birth weight (less than 5.5 pounds), and for mothers with higher BMI's at delivery. Married mothers are less likely to deliver by cesarean than are unmarried mothers.

Being born in a state that had passed any form of a leave law is associated with an 8 percentage point drop in the probability of cesarean delivery for the large sample and a 34 percentage point drop for the small sample. Children born in states with maternity leave laws guaranteeing a specified number of weeks of leave are 8 percentage points less likely to be delivered by cesarean for the large sample and 24 percentage points less likely to be delivered by cesarean for the small sample, compared to children born in states without such laws. For both the large and small samples, the probability of

cesarean delivery was not significantly different in states with leave laws requiring that insurance coverage continue during the leave, in states with laws that granted parental leave, or in states with "FMLA-like" laws compared to states without these types of laws.

Since the impact of the laws differs considerably between the large and small samples, regressions using the small sample are also run without the inclusion of the additional control variables (i.e., the variables relating to income and employment). This is done to determine whether not controlling for these additional variables (as is the case for the large sample) is biasing the impact of the law toward zero or if the large and small samples represent different selections of births. Comparing columns 2 and 3 of Table 6 suggests the impact of the laws is approximately the same for the small sample with all of the control variables included compared to the small sample when the additional controls are excluded. This suggests that the large and small samples represent different selections of births. Therefore, the regression results for the large sample are the preferred estimates since the sample size is so limited for the small sample.

Robustness Checks

To account for alternative explanations for the apparent negative association between leave laws and the likelihood of cesarean delivery, several robustness checks are performed: i) including controls for HMO enrollment and the ratio of Medicaid to private Ob/Gyn fees, ii) limiting the sample to births between 1985 and 1993, iii) examining births to mothers working at least the minimum number of hours per week required by the state's leave law in order to be eligible for leave, and iv) examining births to mothers who were not working in the birth year.

HMO Enrollment and the Medicaid Fee Ratio. The estimate of β_3 in equation (1) will be biased if the difference in the probability of cesarean in the treatment and control states is due to other state-specific factors that may be changing during this period that are correlated with both the probability of cesarean delivery and the existence of a state leave law. Changes in other state-specific factors such as HMO enrollment and the fee-reimbursement level for cesarean delivery paid by the state Medicaid program may also be impacting cesarean rates during this period, leading to biased estimates of β_3 . Thus, HMO enrollment and the ratio of Medicaid reimbursement to private insurance reimbursement are included to check for robustness.

The percentage of each state's population enrolled in an HMO was obtained from *Health, United States, 2007* published by the NCHS. Since HMO enrollment data are not available for 1981-1984, 1986-1989, and 1991-1993, HMO enrollment is linearly predicted for the missing years using the data that is available.²⁸ The HMO enrollment data are presented in Table 7 in Appendix A. It should also be noted that HMO enrollment data is missing for some states and years, particularly in 1980 and 1985. Therefore, births in a state and year in which data was not available are excluded from this specification.

Data on Medicaid reimbursement for maternity care is obtained from Currie et al. (1994). They calculate the ratio of Medicaid to private Ob/Gyn fees for 1979, 1986, and 1992. Although only three years of data are available, the ratio is linearly predicted for

²⁸ For example, HMO enrollment in 1981 is estimated using the difference in HMO enrollment between 1985 and 1980, dividing the difference by five, and then adding that value to the 1980 HMO enrollment value.

1980-1985 and 1987-1991.²⁹ The Medicaid fee ratios are presented in Table 8 in Appendix A. The Medicaid fee ratio is not available for Alaska, Arizona, Kentucky, Rhode Island, Texas, or Wyoming. Therefore, births in these states are excluded from this specification.

For both the large and small samples, the inclusion of HMO enrollment and the Medicaid fee ratio in the regression increases the estimated negative impact of the laws on the probability of cesarean delivery. As shown in Tables 9 and 10 in Appendix A, the estimated effect of the leave laws on the probability of cesarean delivery increases from -0.08 to -0.10 for the large sample and from -0.24 to -0.27 for the small sample.

In addition, controlling for HMO enrollment and the Medicaid fee ratio in the large sample results in a statistically significant coefficient on the insurance law variable, suggesting that leave laws with insurance requirements are associated with a 9 percentage point drop in the probability of cesarean. However, this coefficient is not significant in the small sample. The impact of the parental and "FMLA-like" leave laws remains insignificant at standard significance levels in both samples when controls for HMO enrollment and Medicaid reimbursements rates are included. These results suggest that failing to control for HMO enrollment and the Medicaid fee ratio biases the estimated impact of the leave laws toward zero.³⁰

²⁹ For example, the 1980 fee ratio is calculated by taking the difference between the 1986 and 1979 ratios, dividing the difference by 6, and then adding that value to the 1979 ratio.

³⁰ When HMO enrollment and the Medicaid fee ratio are each included individually in the regressions, the estimated coefficients on the various law variables are qualitatively similar in both magnitude and significance. These results are available from the author.

Post-1985 Births. An additional robustness check controls for HMO enrollment and the Medicaid fee ratio and also limits the sample to births between 1985 and 1993, since cesarean rates leveled off around 1985 and the majority of the state leave laws were passed in the latter half of the 1980s. Column 2 of Tables 9 and 10 present the regression results. For both the large and small samples, the estimated impact of leave laws on the probability of cesarean delivery increases from the previous robustness check. For the large sample, the estimated impact of the leave laws increases from -10 to -13 percentage points. For the small sample, the estimated impact of any form of leave law increases from -33 to -35 percentage points and the estimated impact of leave laws granting a specified number of weeks of leave increases from -27 to -29 percentage points. The coefficients on the insurance, parental, and "FMLA-like" law variables remain insignificant at standard significance levels.

Hours of Work Requirement. Under most of the state leave laws, employees were eligible for leave only if they worked a minimum number of hours per week.³¹ Therefore, an additional robustness check examines all births before 1993 while still controlling for HMO enrollment and the Medicaid fee ratio and compares births to women working at least the minimum number of hours per week required by the state's leave law during the fourth quarter before the birth of the child to births to women working less than the minimum number of hours required by the law and births in states without leave laws in place. Column 3 of Tables 9 and 10 present the regression results. Compared to when only HMO enrollment and Medicaid reimbursement rates are

³¹ The hours of work requirement varied by state. Some states required that employees work only 20 hours per week, while other states required employees to work 40 hours per week to be eligible to take leave.

included as controls (column 1), the estimated impact of the leave laws on the probability of cesarean delivery decreases from -0.10 to -0.08. For the small sample, the probability of cesarean delivery decreases from -0.33 to -0.25 in states that had any form of a leave law relative to the states without such a law. However, states that passed leave laws granting a specified number of weeks of leave do not experience a different probability of cesarean compared to states without these laws in this specification. These results suggest that examining the entire sample of working women instead of just those women working enough hours to be eligible for leave overestimates the impact of the leave laws on the probability of cesarean delivery.

Not Working in the Birth Year. One additional robustness check is performed using the group of mothers who did not work (that is, they were either unemployed or not in the labor force) in the year their child was born.³² If leave laws have a casual effect, it is expected that the probability of cesarean delivery among this group of mothers will not be impacted by the existence of a leave law since these women were not working.

The regression results in Table 11 in Appendix A provide mixed evidence on this point. On the one hand, the results suggest that the probability of cesarean in states with any type of leave law is 11 percentage points lower compared to states with no law. On the other hand, the probability of cesarean is not significantly different between states with and without laws for all of the law categories except "any law." For all of the other

³² Means for this sample are generally similar to the means for the base sample. Notable differences for this sample compared to the base sample include a lower mean AFQT score, a higher percentage of African Americans, a lower percentage of women who received prenatal care, and a lower percentage of women with a bachelor's degree or higher.

law categories, the probability of cesarean delivery is *not* significantly different for unemployed women in states with leave laws relative to states without leave laws.

Summary. In all of the specifications, the leave laws are associated with a decreased likelihood of cesarean delivery. Leave laws granting a specified number of weeks of leave are associated with an 8 to 13 percentage point decline in the probability of cesarean delivery for the large sample and a 17 to 29 percentage point decline in the probability of cesarean delivery for the small sample. Leave laws granting any form of leave are associated with an 8 to 13 percentage point decline in the probability of cesarean delivery for the large sample and a 25 to 35 percentage point decline in the probability of cesarean delivery for the small sample. Leave laws requiring that insurance coverage continue and granting parental leave, however, are shown to have little impact on cesarean rates. These results are robust with no variation in the direction of impact of the leave laws on the probability of cesarean and little change in significance across the various specifications.

As suggested earlier, leave laws may cause cesarean rates to fall if women are taking leave prior to the birth and as a result are less likely to deliver by cesarean. Additionally, the incentive to capture the extra time off of work granted for cesarean delivery may have declined if the same amount of leave is granted regardless of method of delivery after the leave laws were passed.

It cannot necessarily be inferred that the leave laws *caused* lower cesarean rates. It is possible that the leave laws are endogenous and that the regression results are simply picking up the effect of some other factor that is correlated with both the state's passage

of a leave law and the probability of cesarean delivery. Indeed, the result that leave laws are associated with decreased cesarean delivery among those outside the labor force is consistent with endogeneity of state leave laws.

Although this may be the case, a comparison of the summary statistics between the states that passed leave laws and the states that did not suggests that little variation exists between mothers and births in these two sets of states. The only notable differences between states that passed leave laws granting a specified number of weeks of leave and states without these laws are a slightly higher percentage of whites and a slightly higher percentage of the state's population enrolled in an HMO in states with the laws.

Impact of the FMLA

The regression results estimating the impact of the federal FMLA using births during the entire sample period from 1979 to 2000 are presented in Table 12 in Appendix A. The estimated coefficients for the control variables are presented in columns 1 and 3 of Table 5. As in the pre-FMLA analysis, previous cesarean delivery is a strong predictor of a current cesarean. The likelihood of cesarean delivery also rises with the mother's BMI at delivery, but declines for higher order births.

The results suggest that for both the large and small samples the passage of the federal FMLA did not impact the probability of cesarean differently in states that did not already had leave laws compared to states that already had "FMLA-like" laws.

Controlling for HMO enrollment has little impact on the magnitude and significance of the coefficients.³³

The fact that the change in the probability of cesarean delivery in states that did not already have a leave law in place before the federal laws was passed is not significantly different than in states that had passed "FMLA-like" laws before 1993 suggests that the FMLA had little impact on cesarean rates in the United States. If the FMLA did have an impact of cesarean rates, states that did not have leave laws in place prior to the FMLA should have experienced a larger change in the probability of cesarean delivery relative to the states that already had "FMLA-like" laws.

Summary

The empirical results suggest that the state leave laws are associated with lower rates of cesarean delivery, but that the federal FMLA had little impact on cesarean rates. Using the preferred results from the large sample, it is estimated that the state laws are associated with a decreased likelihood of cesarean delivery, with estimates ranging from an 8 to 13 percentage point reduction in the probability of cesarean delivery.

³³ The Medicaid data is used only in the pre-FMLA regressions since data is not available beyond 1992. The question asking the NLSY respondents whether they were unemployed or not in the labor force was not asked after 1992. Therefore, this sample is only used in the pre-FMLA period.

CHAPTER 9

CONCLUSION

Rates of cesarean delivery have increased dramatically since 1965, with nearly a third of all births being delivered by cesarean in 2006. Previous research has attempted to explain this trend in cesarean rates by examining clinical and medical factors, maternal requests for cesarean delivery, and the financial incentives surrounding delivery. This paper contributes to previous research by estimating the impact of state and federal family leave laws on cesarean delivery. Theoretically, the predicted impact of the leave laws on cesarean rates is ambiguous, as leave laws led to increased health insurance coverage during leave and altered parents' leave taking for childbirth.

The empirical evidence presented in this paper suggests that state leave laws are associated with lower cesarean rates, but that the federal FMLA had little impact on cesarean rates. Empirical results suggest that state leave laws decreased the probability of cesarean delivery by 8 to 13 percentage points. This substantial negative impact of the state laws suggests that cesarean rates in the United States may have risen even higher if not for these laws.

The apparent negative relationship between the state leave laws and cesarean rates may, however, reflect an underlying endogeneity of these state-level laws. For example, the passage of leave laws and lower cesarean rates in these states may reflect a broader culture of both women's rights and a more natural approach to childbirth. There is some evidence that the state laws are endogenous, as women who were not in the labor force

when their children were born experience a lower probability of cesarean delivery in states with leave laws. It would have also been expected that if, in fact, the state leave laws caused lower cesarean rates, then the federal FMLA should have had a larger impact on cesarean rates in states that did not already have leave laws in place. The possible endogeneity of the state leave laws is an important issue for future research to address.

Although controls for an extensive list of mother- and child-specific factors are included, the lack of physician and hospital characteristics is another limitation of this analysis. Previous research has shown that the choice between cesarean and vaginal delivery is sensitive to both physician and hospital characteristics. Therefore, if these were changing during the time that the states passed the leave laws, the empirical results may be biased. Although physician and hospital characteristics were not available in the NLSY dataset, future research may benefit from including these in the analysis.

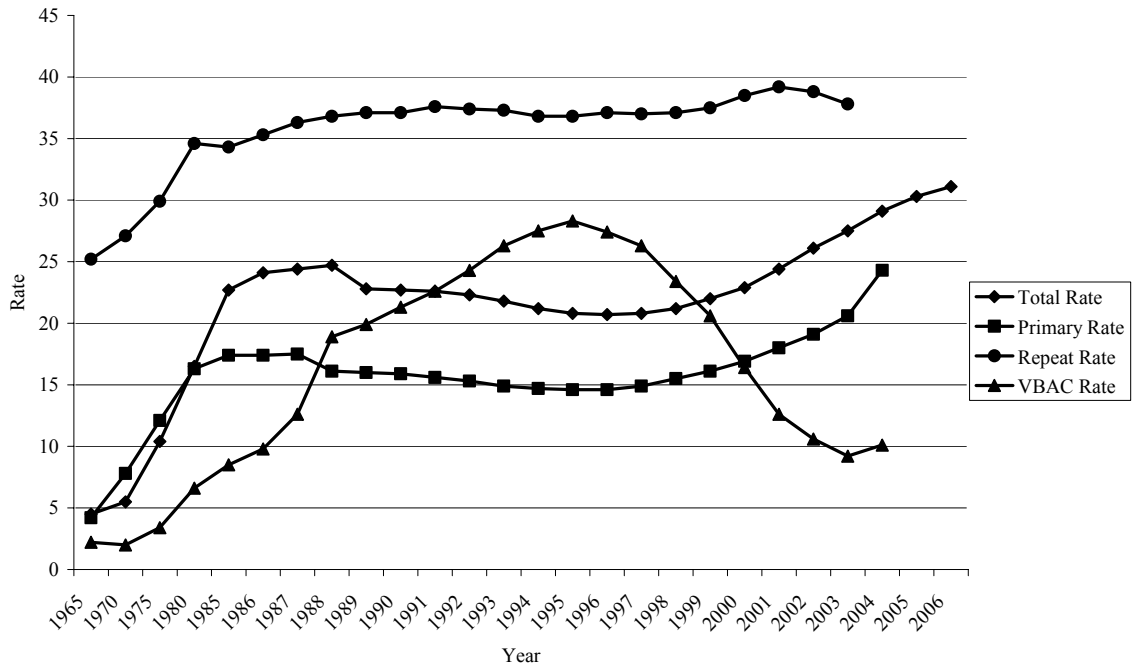
In conclusion, the empirical evidence suggests that state leave laws impacted the delivery decisions made by physicians and mothers, leading to lower rates of cesarean delivery. If in fact cesarean rates are "too high", then the passage of family leave laws may have been welfare enhancing in the sense that the leave laws impacted cesarean rates in such a way as to get closer to the optimal level of cesarean delivery.

APPENDICES

APPENDIX A

TABLES AND FIGURES

Figure 1. Cesarean Section Rates for the United States, 1965-2006.



Sources: 1965-1988: CDC (1993); 1989-2005: NCHS (2007a); 2006: NCHS (2007b).

Note: Cesarean rates were not available every year until after 1985. Therefore, the first five data points on this graph range from 1965-1985.

Table 1. International Comparison of Cesarean Rates among OECD Countries.

| Cesarean Sections per 100 Live Births | | | |
|---------------------------------------|------|------|------|
| Country | Year | | |
| | 1990 | 1997 | 2004 |
| Mexico | | 28 | 38 |
| Italy | 21 | 27 | 37 |
| Korea | | | 35 |
| Australia | 18 | 20 | 29 |
| United States | 23 | 21 | 29 |
| Hungary | | 16 | 28 |
| Luxembourg | 17 | 17 | 27 |
| Portugal | 20 | 23 | 27 |
| Germany | 16 | 18 | 26 |
| Switzerland | 19 | | 26 |
| Canada | | 18 | 25 |
| Ireland | 11 | 15 | 24 |
| Spain ¹ | 14 | 20 | 24 |
| Austria | | 14 | 24 |
| United Kingdom | 12 | 17 | 22 |
| New Zealand | 12 | 16 | 22 |
| Denmark | 12 | 13 | 20 |
| Slovak Republic | 9 | 13 | 19 |
| France ² | 14 | 16 | 18 |
| Belgium | 10 | 14 | 18 |
| Sweden ¹ | 11 | 13 | 17 |
| Finland | 14 | 16 | 17 |
| Iceland | 12 | 16 | 16 |
| Czech Republic | 8 | 12 | 16 |
| Norway | 13 | 13 | 15 |
| Netherlands | 7 | 10 | 14 |
| OECD Average | 14 | 16 | 22 |

a. 2003

b. 2001

Source: OECD (2007)

Table 2. Detailed Description of the State Leave Laws.

| State | Date | Leave Period | Insurance | Sector Covered | Parental or Maternity | Maternity Disability Law | Statute/Code | Source |
|-------------------|---------|--------------|-----------|----------------|-----------------------|--------------------------|--|-------------------|
| Alabama | NONE | | | | | | | |
| Alaska | | 18 wks | yes, OE | PU | P | | | Irvin & Silberman |
| | 1992 | 18 wks | yes, OE | PU | P | | | MLR (1993) |
| | | 18 wks | | PU | P | | § 23.10.500 to § 23.10.550; § 39.20.305 | NPWF |
| | | 18 wks | yes | PU | P | | § 23.10.500 to §23.10.550 | WB |
| Arizona | | 12 wks | | PU | P | | | Irvin & Silberman |
| | | 12 wks | | PU | P | | § R2-5-411 to -414 | NPWF |
| | 12/1986 | 12 wks | | PU | P | | § R2-5-411 | State Law Website |
| Arkansas | | up to 6mos | | PU | P | | § 21.4.210 | NPWF |
| | 1975 | up to 6mos | | PU | P | | § 21.4.210 | State Law Library |
| California | | 1 year | | PU | | | § 19991.6 | NPWF |
| | 1981 | 1 year | | PU | P | | § 19991.6 | Lexis Nexis |
| | | 1 year | | PU | P | | § 19991.6 | WB |
| | 1980 | not listed | | | M | MD | | Baum (2003) |
| | 1980 | 4 mos | | PU, PR | M | MD | § 12945(1)-(2), §12960-75, § 7286.9, § 7420-7466 | Lenhoff & Becker |
| | | 4 mos | | PU, PR | M | | § 12945 | NPWF |
| | 1/1980 | not listed | | | | | | Waldfogel (1998) |
| | | 4 mos | | PU, PR | M | MD | § 12945 | WB |
| | | 4 mos | | PU, PR | M | | § 12945 (B)(2) | |
| | 1/1992 | 17 wks | | | | | | Baum (2003) |
| | | 4 mos | yes, OE | PU, PR | P | | | Irvin & Silberman |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|--------------------|--------------------|------------|---------|--------|---|----------|--|-------------------|
| | 1/1992 | 4 mos | | PU, PR | | | | Kane |
| | 1991 | 4 mos | | PU, PR | P | | | MLR (1992) |
| | | 12 wks | | PU, PR | P | | § 12945.2 | NPWF |
| | | 4mos | yes, OE | PU, PR | P | | § 12945.2 | WB |
| Colorado | Date Not Available | 3 mos | | PU | P | | | Irvin & Silberman |
| | | 13 wks | | PU | P | | 801 P-5-24 | NPWF |
| | | RP | | PU, PR | M | | § 80.8(d) | BNA |
| | 1988 | RP | | PU, PR | M | | § 80.8 | State Law Website |
| | | RP | | PU, PR | M | | § 80.8(d) | WB |
| Connecticut | 1973 | not listed | | | M | MD | | Baum (2003) |
| | | RP | | PU, PR | M | MD | § 46a-60(a)(7)(B)-(D) | BNA |
| | 1986 | RP | | PU, PR | M | MD | § 46a-60(a)(7)(B)-(D), § 46a-82 to -96 | Lenhoff & Becker |
| | | RP | | PU, PR | M | MD | § 46a-60 | MLR (1974) |
| | | RP | | PU, PR | M | MD | | NPWF |
| | 1/1973 | not listed | | | M | MD | | Waldfogel (1998) |
| | | RP | | PU, PR | M | MD | § 46a-60(a), § 46a-82 to -96 | WB |
| | 1/1988 | 24 wks | | PU | P | | | BNA |
| | | 24 wks | yes | PU | P | | | Irvin & Silberman |
| | 1987 | 24 wks | yes | PU | P | MD | § 87-291 | Lenhoff & Becker |
| 1987 | 24 wks | | PU | P | | | MLR (1988) | |
| | 24 wks | | PU | P | | § 5-248a | NPWF | |
| | 24 wks | yes | PU | P | | § 5-248a | WB | |
| 7/1990 | 12 wks | | | | | | | Baum (2003) |
| | 16 wks, 12 wks | | PR | P | | | | Irvin & Silberman |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|-----------------------------|---------|----------------|-----|--------|---|----|---------------------------------|----------------------------|
| | 7/1990 | 16 wks | | PR | | | | Kane |
| | 7/1990 | 12 wks | | PR | P | | | MLR (1989) |
| | 7/1991 | 16 wks | | PR | P | | | MLR (1989) |
| | | 16 wks | | PR | P | | § 31-51kk to -51nn | NPWF |
| | | 16 wks, 12 wks | | PR | P | | § 31-51cc to -51gg | WB |
| Delaware | NONE | | | | | | | |
| District of Columbia | 4/1991 | 16 wks | | | | | | Baum (2003) |
| | | 16 wks | yes | PU, PR | P | | | Irvin & Silberman |
| | 4/1991 | 16 wks | | PU, PR | | | | Kane |
| | 4/1991 | 16 wks | yes | PU, PR | P | | | MLR (1990) |
| | | 16 wks | | PU, PR | P | | § 32-501 to -503 | NPWF |
| | 4/1991 | not listed | | | | | | Waldfoegel (1998) |
| | | 16 wks | yes | PU, PR | P | | § 36-1301 to -1316 | WB |
| Florida | | 6 mos | | PU | P | | | Irvin & Silberman |
| | 1991 | 6 mos | | PU | P | | | MLR (1992) |
| | | 6 mos | | PU | P | | § 110.22; 60 FL ADC 60L-23-.006 | NPWF |
| | | 6 mos | | PU | P | | § 110.221 | WB |
| Georgia | | 12 wks | yes | PU | P | | | Irvin & Silberman |
| | 1992 | 12 wks | | PU | P | | | MLR (1992) |
| | | 12 mos | | PU | P | | § 478-1-18 | NPWF |
| | | 12 wks | yes | PU | P | | § 45-24-1 to -9 | WB |
| Hawaii | | RP | | PU, PR | M | MD | § 12-23-58 | BNA |
| | 11/1982 | RP | | PU, PR | M | MD | § 12-23-58 | HI Civil Rights Commission |
| | 11/1982 | RP | | PU, PR | | MD | | Kane |
| | 1983 | RP | | PU, PR | M | MD | §12-23-1 to -22; § 12-23-58 | Lenhoff & Becker |
| | | RP | | PU, PR | M | MD | § 12-46-101 to -108 | WB |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|-----------------|---------|--------------|---------|--------|---|----|---------------------------------------|-------------------|
| | | 4 wks | | PU, PR | P | | | Irvin & Silberman |
| | 1/1992 | 4 wks | | PU | P | | | MLR (1991) |
| | 7/1994 | 4 wks | | PR | P | | | MLR (1991) |
| | | 4 wks | | PU, PR | P | | § 398-1-10 | NPWF |
| | 1/1994 | 4 wks | | PU, PR | P | | § 1-10; § 79-32 | WB |
| Idaho | NONE | | | | | | | |
| Illinois | | 90 days, 1yr | | PU | P | | | Irvin & Silberman |
| | | up to 6 mo | | PU | P | | § 600.686 | NPWF |
| | | 1 year | | PU | P | | § 303.148 | NPWF2 |
| | 5/1984 | 1 year | | PU | P | | § 303.148 | State Law |
| | | 1 year | yes, OE | PU | P | | § 415.8c | Website/Library |
| | | RP | | PU, PR | M | MD | § 2.10 | WB |
| | 11/1985 | RP | | PU, PR | M | MD | § 5210 | BNA |
| | | | | | | | | State Law Website |
| Indiana | NONE | | | | | | | |
| Iowa | 6/1987 | 8 wks | | PU, PR | M | MD | House Bill 86 | BNA |
| | 7/1987 | 8 wks | | PU, PR | | MD | | Kane |
| | 1988 | 8 wks | | PU, PR | M | MD | § 601A.6(2); § 601A.15-.17 | Lenhoff & Becker |
| | 1987 | 8 wks | | PU, PR | M | MD | | MLR (1988) |
| | | 8 wks | | PU, PR | M | MD | § 216:6:2 | NPWF |
| | | 8 wks | | PU, PR | M | MD | § 601A; §601A.6 | WB |
| Kansas | | RP | | PU, PR | M | MD | § 21-32-6 | BNA |
| | 1/1974 | RP | | PU, PR | | MD | | Kane |
| | 1977 | RP | | PU, PR | M | MD | § 21-32-6(d); § 21-41-1 to -45-25, 8A | Lenhoff & Becker |
| | 11/1972 | RP | | PU, PR | M | MD | § 21-32-6 | State Law Website |
| | | RP | | PU, PR | M | MD | § 21-32-6 | WB |
| | | 1 year | | PU | P | | | Irvin & Silberman |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|----------------------|---------|------------------|---------|--------|---|----|--------------------------------|-------------------|
| | | RP, up to 1yr | | PU | P | | § 1-9-6 | NPWF |
| | 5/1979 | RP, up to 1 yr | | PU | P | | § 1-9-6 | State Law Website |
| Kentucky | NONE | | | | | | | |
| Louisiana | 9/1987 | 4 mos | | PU, PR | | MD | | Kane |
| | 1989 | 6wks, up to 4mos | | PU, PR | M | MD | § 23:1008 | Lenhoff & Becker |
| | 1987 | 4 mos | | PU, PR | M | MD | | MLR (1988) |
| | | 6wks, up to 4mos | | PU, PR | M | MD | § 23:341-342 | NPWF |
| | | 6wks, up to 4mos | | PU, PR | M | MD | § 23:1008 | WB |
| Maine | 4/1988 | 8 wks | | | | | | Baum (2003) |
| | 1988 | 8 wks | yes, OE | PU, PR | P | MD | | Lenhoff & Becker |
| | 1988 | 8 wks | | PU, PR | P | | | MLR (1989) |
| | | 10 wks | yes, OE | PU, PR | P | | | Irvin & Silberman |
| | 8/1988 | 10 wks | | PU, PR | | | | Kane |
| | 1991 | 10 wks | | PU, PR | P | | | MLR (1991) |
| | | 10 wks | | PU, PR | P | | § 843-845 | NPWF |
| | | 10 wks | yes, OE | PU, PR | P | | § 843-849 | WB |
| | 4/1988 | not listed | | | | | | Waldfogel (1998) |
| Maryland | | 12 wks | yes, OE | PU | P | | | Irvin & Silberman |
| | 1988 | 12 wks | | PU | P | | | MLR (1989) |
| | | 12 wks | yes, OE | PU | P | | § 37C | WB |
| Massachusetts | 10/1972 | 8 wks | | | | | | Baum (2003) |
| | | 8 wks | | PU, PR | M | | § 4.11A, § 3.02 (7)a-h, § 8.01 | BNA |
| | | 8 wks | PU Only | PU, PR | M | | | Irvin & Silberman |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|--------------------|-----------------------|------------------------|---------|--------|---|----|--|-------------------|
| | 10/1972 | 8 wks | | PU, PR | | | | Kane |
| | 1982, | | | | | | | |
| | 1983 | 8 wks | | PU, PR | M | | § 105D; § 1(5); 4(11A); § 8.01; § 1.03-.18 | Lenhoff & Becker |
| | 1972 | 8 wks | | PU, PR | M | | | MLR (1973) |
| | 1988 | insurance amendment | PU Only | PU | | | | MLR (1989) |
| | | 8 wks | | PU, PR | M | | § 105D | NPWF |
| | 10/1972 | not listed | | | | | | Waldfogel (1998) |
| | | 8 wks | | PU, PR | M | | § 105D; § 1 | WB |
| Michigan | NONE | | | | | | | |
| Minnesota | 7/1987 | 6 wks | | | | | | Baum (2003) |
| | 6/1987 (signed) | 6 wks | | PU, PR | P | | | BNA |
| | | 6 wks | yes, OE | PU, PR | P | | | Irvin & Silberman |
| | 8/1987 (effective) | 6 wks | | PU, PR | | | | Kane |
| | 1989 | 6 wks | yes, OE | PU, PR | P | | § 181.93 to .98 | Lenhoff & Becker |
| | 1987 | 6 wks | | PU, PR | P | | | MLR (1988) |
| | | 6 wks | | PU, PR | P | | § 181.940-942 | NPWF |
| | 7/1987 | not listed | | | | | | Waldfogel (1998) |
| | | 6 wks | yes, OE | PU, PR | P | | § 181.940 to .944 | WB |
| Mississippi | NONE | | | | | | | |
| Missouri | NONE | | | | | | | |
| Montana | | RP | | PU | P | MD | | Irvin & Silberman |
| | | RP | | PU, PR | M | MD | | BNA |
| | 9/1984 | RP | | PU, PR | | MD | | Kane |
| | 1987 | RP | | PU, PR | M | MD | § 49-2-310 to -311, § 49-2-501 to -509 | Lenhoff & Becker |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|-----------------------|---------------|----------------------------|---------|--------|---|----|--|------------------------------------|
| | | RP | | PU, PR | M | | § 49-2-310 to -312, § 24.9.1203 | NPWF |
| | 9/1984 | RP | | PU, PR | M | MD | § 49-2-310 | State Law Website |
| | | RP | | PU, PR | M | MD | § 49-2-310 to -311 | WB |
| Nebraska | NONE | | | | | | | |
| Nevada | NONE | | | | | | | |
| New Hampshire | | RP, up to 6mos | | PU, PR | M | MD | § 1001(b) | BNA |
| | 11/1984 | 6 mos | | PU, PR | | MD | | Kane |
| | 1987, 1988 | RP | | PU, PR | M | MD | § 354-A:9 to :10; § 402.03; § 201.01 to 212.06 | Lenhoff & Becker |
| | 5/1992 | RP | | PU, PR | M | MD | § 354-A:7 | NPWF |
| | | RP | | PU, PR | M | MD | § 354-A:7 | State Law Website & Lexis Nexis |
| | | RP | | PU, PR | M | MD | § 354-A:1 to A:14 | WB |
| New Jersey | 4/1990 | 12 wks | | | | | | Baum (2003) |
| | | 12 wks | PU only | PU, PR | P | | | Irvin & Silberman |
| | 4/1990 | 12 wks | | PU, PR | | | | Kane |
| | 1990 | 12 wks | PU only | PU, PR | P | | | MLR (1991) |
| | | 12 wks | | PU, PR | P | | § 34:11B-1 to -4 | NPWF |
| | 4/1990 | not listed | | | | | | Waldfogel (1998) |
| | | 12 wks | | PU, PR | P | | § 34:11B-1 to -16 | WB |
| New Mexico | NONE | | | | | | | |
| New York | NONE | | | | | | | |
| North Carolina | NONE | | | | | | | |
| North Dakota | | 16 wks (FT), prorate PT | yes, OE | PU | P | | | Irvin & Silberman |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | |
|---------------------|---------------|------------------------|---------|--------|---|--|--|
| | 1989 | 4 mos | yes | PU | P | | MLR (1990) |
| | | 2 mos (PT), 4 mos (FT) | | PU | P | § 54-52.4-02 | NPWF |
| | | 2 mos (PT), 4 mos (FT) | yes, OE | PU | P | § 54-52.0-02 to .4-09 | WB |
| Ohio | 7/1989 | RP | | PU, PR | | MD | Kane |
| | 7/1989 | RP | | PU, PR | M | MD | § 4112-5-05 State Law Website |
| Oklahoma | | 12 wks | yes, OE | PU | P | | Irvin & Silberman |
| | 1989 | not listed | | PU | P | | MLR (1990) |
| | | 12 wks | | PU | P | § 840-2.22 | NPWF |
| | | 12 wks | yes | PU | P | § 840.7c | WB |
| Oregon | | RP | | PU, PR | M | Childbearing | Sex Discrimination Guidelines, 3b BNA |
| | 1/1988 | 12 wks | | | | | Baum (2003) |
| | 1/1988 | 12 wks | | PU, PR | P | | BNA |
| | | 12 wks | | PU, PR | P | | Irvin & Silberman |
| | 1/1988 | 12 wks | | PU, PR | | | Kane |
| | 1989 | 12 wks | | PU, PR | P | § 659.010-.121, § 659.360-.370 | Lenhoff & Becker |
| | 1987 (passed) | 12 wks | | PU, PR | P | | MLR (1988) |
| | | 12 wks | | PU, PR | P | § 659A.150-.171, § 839-009-0240 | NPWF |
| | 1/1988 | not listed | | | | | Waldfoegel (1998) |
| | | 12 wks | no | PU, PR | P | § 659.360, § 659.389, § 659.560 to -.570 | WB |
| Pennsylvania | NONE | | | | | | |
| Rhode Island | 7/1987 | 13 wks | | | | | Baum (2003) |
| | 7/1987 | 13 wks | yes | PU, PR | P | | BNA |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|-----------------------|--------|--------------------------|---------|--------|---|----------------------------|--------------------------------------|-------------------|
| | | 13 wks | yes | PU, PR | P | | | Irvin & Silberman |
| | 7/1987 | 13 wks | | PU, PR | | | | Kane |
| | 1988 | 13 wks | yes | PU, PR | P | § 28-48-1 to -9 | | Lenhoff & Becker |
| | 1987 | 13 wks | yes | PU, PR | P | | | MLR (1988) |
| | | 13 wks | | PU, PR | P | § 28-48-1 to -10 | | NPWF |
| | 7/1987 | not listed | | | | | | Waldfogel (1998) |
| | | 13 wks | yes | PU, PR | P | § 28-5-38, § 28-48-1 to -4 | | WB |
| South Carolina | 1974 | RP | | PU | | § 8-11-1-40 | | Lexis Nexis |
| | | RP | | PU, PR | M | § 8-11-1-40 | | NPWF2 |
| | | up to 6 mos | | PU | M | MD | § 8-11-40 to -41 | WB |
| South Dakota | NONE | | | | | | | |
| Tennessee | 1/1988 | 16 wks | | | | | | Baum (2003) |
| | 1/1988 | 4 mos | | PU, PR | M | | | BNA |
| | | 4 mos | | PU, PR | M | | | Irvin & Silberman |
| | 1/1988 | 4 mos | | PU, PR | | | | Kane |
| | 1988 | up to 4 mos | yes, OE | PU, PR | M | MD | § 4-21-408 | Lenhoff & Becker |
| | 1987 | 4 mos | | PU, PR | M | | | MLR(1988) |
| | | 4 mos | | PU, PR | M | | § 4-21-408 | NPWF |
| | 1/1988 | not listed | | | | | | Waldfogel (1998) |
| | | 4 mos | yes, OE | PU, PR | M | | § 4-21-408 | WB |
| Texas | 9/1991 | 6 wks | | PU | P | | HB 1, Article X, § 8.13 | State Law Website |
| | | 6 wks | | PU | P | | TX Session Law § 8.2, § 8.11, § 8.13 | WB |
| Utah | NONE | | | | | | | |
| Vermont | 1989 | 12 wks | yes | PR | M | | | MLR(1990) |
| | 1990 | amended to public sector | | PU, PR | M | | | MLR (1991) |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | | |
|----------------------|---------|--------------------------|---------|--------|---|-----------|--|-------------------|
| | 7/1992 | 12 wks | | | | | | Baum (2003) |
| | | 12 wks | yes, OE | PU, PR | P | | | Irvin & Silberman |
| | 7/1992 | 12 wks | | PU, PR | | | | Kane |
| | 1992 | amended to public sector | | PU, PR | P | | | MLR (1993) |
| | | 12 wks | | PU, PR | P | § 471-472 | | NPWF |
| | | 12 wks | yes, OE | PU, PR | P | § 470-472 | | WB |
| Virginia | 7/1991 | 6 wks | yes | PU | P | | Dept of Personnel & Training Parental Leave Policy | VA Dept of HR |
| | | 6 wks | yes | PU | P | | Dept of Personnel & Training Parental Leave Policy | WB |
| Washington | 1973 | not listed | | | | MD | | Baum (2003) |
| | | RP | | PU, PR | M | MD | § 162-30-020(5) | BNA |
| | 1977 | RP | | PU, PR | M | MD | § 162-08-011 to -700, § 162-30-020 | Lenhoff & Becker |
| | | RP | | PU, PR | M | MD | § 162-30-020 | NPWF |
| | 6/1972 | RP | | PU, PR | M | MD | § 162-30-020 | State Law Website |
| | 10/1973 | not listed | | | | | | Waldfogel (1998) |
| | 9/1989 | 12 wks | | | | | | Baum (2003) |
| | | 12 wks | yes, OE | PU, PR | P | | | Irvin & Silberman |
| | 9/1989 | 12 wks | | PU, PR | | | | Kane |
| | 1989 | 12 wks | | PU, PR | P | | | MLR (1990) |
| | | 12 wks | | PU, PR | P | | § 49.78.020-.030 | NPWF |
| | | 12 wks | yes, OE | PU, PR | P | | § 49.78.010 to .901 | WB |
| West Virginia | | 12 wks | yes, OE | PU | P | | | Irvin & Silberman |
| | 1989 | 12 wks | yes, OE | PU | P | | | MLR (1990) |
| | | 12 wks | | PU | P | | § 21-5D-2 to -4 | NPWF |
| | | 12 wks | yes, OE | PU | P | | § 21-5D-1 to -9 | WB |

Table 2. Detailed Description of the State Leave Laws- Continued.

| | | | | | | | |
|------------------|--------|------------|-----|--------|---|----------|-------------------|
| Wisconsin | 4/1988 | 6 wks | | | | | Baum (2003) |
| | | 6 wks | yes | PU, PR | P | | Irvin & Silberman |
| | 4/1988 | 6 wks | | PU, PR | | | Kane |
| | 1988 | 6 wks | yes | PU, PR | P | § 103.10 | Lenhoff& Becker |
| | 1988 | 6 wks | yes | PU, PR | P | | MLR (1989) |
| | | 6 wks | | PU, PR | P | § 103.10 | NPWF |
| | 4/1988 | not listed | | | | | Waldfogel (1998) |
| | | 6 wks | yes | PU, PR | P | § 86 | WB |
| Wyoming | NONE | | | | | | |
| FMLA | 8/1993 | 12 wks | yes | PU, PR | P | | |

Table 2. Detailed Description of the State Leave Laws- Continued.

Key:

LEAVE PERIOD:

RP= reasonable period of leave

INSURANCE:

OE= insurance coverage must continue, but at the employees OWN EXPENSE

SECTOR COVERED:

PU= Public Sector

PR= Private Sector

PARENTAL or MATERNITY:

P= Parental Leave

M= Maternity Leave

DISABILITY LAW:

MD= Maternity Disability

SOURCE:

BNA= Bureau of National Affairs

MLR= Monthly Labor Review

NPWF= National Partnership for Women and Families

WB= Women's Bureau

Notes:

For states where no date was listed by other researchers or if the date was not consistent across researchers, I consulted the state website, state law library, and/or the state department in charge of the law to obtain the date the law was passed.

The date listed by the Monthly Labor Review (MLR) corresponds to the date that the law was passed, not necessarily the date that the legislation went into effect. If the MLR date differed from other sources, I used the date most consistent with all of the sources.

The dates listed by Lenhoff and Becker consistently differed from those listed by other researchers. If the date listed by Lenhoff and Becker differed from others, the date most consistently listed by other researchers was used.

Table 3. Pre-1993 Leave Law Summary.

| State | State Law Specifications | | | | | |
|-------|--|---|--|--|--|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| | Any Private Sector Leave Law: (any law) ^a | Private Sector Leave Law with Length of Leave Specified: (leave law) ^b | Private Sector Leave Law with Insurance Requirement: (insure law) ^c | Private Sector Parental Leave Law: (parent law) ^d | Private Sector "FMLA-like" Law: (FMLA-like law) ^e | Public Sector Leave Law Passed Prior to Private Sector Law: (public law) ^f |
| AK | | | | | | 1992 |
| CA | 1980 | 1980 | 1992 | 1992 | 1992 | |
| CO | 1988 | | | | | N/A ^g |
| CT | 1973 | 1990 | | 1990 | | 1987 ^h |
| DC | 1991 | 1991 | 1991 | 1991 | 1991 | |
| FL | | | | | | 1991 |
| GA | | | | | | 1992 |
| HI | 1982 | | | | | 1992 ⁱ |
| IL | 1985 | | | | | 1984 |
| IA | 1987 | 1987 | | | | |
| KS | 1979 | | | | | |
| LA | 1987 | 1987 | | | | |
| MD | | | | | | 1988 |
| ME | 1988 | 1988 | 1988 | 1988 | 1988 | |
| MA | 1972 | 1972 | | | | |
| MN | 1987 | 1987 | 1987 | 1987 | 1987 | |
| MT | 1987 | | | | | |
| NH | 1992 | | | | | |
| NJ | 1990 | 1990 | | 1990 | | |
| ND | | | | | | 1989 |
| OH | 1989 | | | | | |
| OK | | | | | | 1989 |
| OR | 1987 | 1987 | | 1987 | | |
| RI | 1987 | 1987 | 1987 | 1987 | 1987 | |
| SC | | | | | | 1974 |
| TN | 1987 | 1987 | 1987 | | | |
| TX | | | | | | 1991 |
| VT | 1989 | 1989 | 1989 | 1992 | 1992 | |
| VA | | | | | | 1991 |
| WA | 1973 | 1989 | 1989 | 1989 | 1989 | |
| WV | | | | | | 1989 |
| WI | 1988 | 1988 | 1988 | 1988 | 1988 | |

Table 3. Pre-1993 Leave Law Summary- Continued.

- a. State passed any type of leave law (i.e., maternity disability and/or maternity and/or parental leave) covering private sector employees. The state did not necessarily specify the length of leave to be granted (i.e., reasonable period of leave).
- b. State passed a law granting a specified number of weeks of leave to employees in the private sector for maternity disability, maternity leave, and/or parental leave.
- c. State passed a law granting a specified number of weeks for parental leave (i.e., both males and females included) to employees in the private sector.
- d. State passed a law granting a specified number of weeks of leave and required that health insurance coverage continue during the period of leave to employees in the private sector.
- e. State passed a law that was similar to the FMLA in that it granted a specified number of weeks of leave to private sector employees, required that health insurance coverage continue during leave, and granted parental leave.
- f. State passed a law granting public sector employees leave prior to the passage of the law granting leave to private sector employees.
- g. The date that Colorado passed the public sector leave law could not be found.
- h. A parental leave law granting 24 weeks of leave to public sector employees was passed in 1987, but a "reasonable period" of leave for maternity disability could be taken as of 1973 by both private and public sector employees.
- i. A parental leave law granting 4 weeks of leave to public sector employees was passed in 1992, but a "reasonable period" of leave for maternity disability could be taken as of 1982 by both private and public sector employees.

Note: States that did not pass leave laws prior to the FMLA are excluded from the table.

Table 4. Pre-1993 Summary Statistics and Coefficients for the Control Variables.

| | Large Sample | | Small Sample ^a | |
|------------------------------------|-------------------|--|---------------------------|--|
| | 1 | 2 | 3 | 4 |
| | Sample Mean | Estimated Coefficient from Equation (1) ^b | Sample Mean | Estimated Coefficient from Equation (1) ^b |
| Cesarean Delivery | 0.24 (0.43) | - | 0.30 (0.46) | - |
| Previous Cesarean | 0.09 (0.29) | 0.704** (22.82) | 0.11 (0.32) | 0.765** (8.52) |
| AFQT | 49.21 (26.36) | -0.001** (3.05) | 56.76 (25.39) | -0.003* (1.68) |
| Age of Mom | 25.75 (3.72) | 0.012** (3.26) | 28.38 (2.63) | -0.005 (0.29) |
| BMI Before Pregnancy | 22.94 (4.44) | -0.008** (2.45) | 23.49 (4.20) | -0.027** (2.51) |
| BMI at Delivery | 28.39 (4.69) | 0.017** (6.48) | 29.08 (4.52) | 0.045** (4.42) |
| White ^c | 0.73 (0.45) | 0.021 (0.70) | 0.75 (0.43) | 0.082 (0.99) |
| Hispanic | 0.06 (0.23) | 0.01 (0.29) | 0.06 (0.23) | -0.038 (0.48) |
| Native American | 0.04 (0.19) | 0.027 (0.68) | 0.04 (0.20) | 0.086 (0.46) |
| Asian | 0.01 (0.08) | -0.001 (0.02) | 0.01 (0.10) | 0.073 (0.39) |
| Other Race | 0.05 (0.21) | 0.003 (0.06) | 0.07 (0.25) | 0.122 (0.68) |
| Length of Child (inches) | 20.13 (1.58) | -0.008 (1.54) | 20.13 (1.51) | 0.012 (0.59) |
| Weight of Child (ounces) | 118.66 (20.97) | 0.001* (1.74) | 119.25 (21.54) | 0.002* (1.70) |
| Born Low Birth Weight | 0.07 (0.26) | 0.14** (3.47) | 0.07 (0.26) | 0.404** (2.46) |
| Gestation (weeks) | 38.70 (2.08) | 0.003 (0.88) | 38.56 (1.97) | -0.022** (2.34) |
| Received Prenatal Care by 3 months | 0.84 (0.37) | 0 (0.02) | 0.86 (0.35) | -0.055 (0.76) |
| Child Female | 0.48 (0.50) | -0.028 (1.60) | 0.49 (0.50) | -0.136* (1.88) |
| Birth Order | 1.64 (0.82) | -0.144** (9.47) | 1.68 (0.79) | -0.187** (5.04) |
| Multiple Birth | 0.01 (0.12) | 0.201* (1.87) | 0.02 (0.14) | 0.173 (0.71) |
| High School ^d | 0.45 | 0.009 | 0.32 | 0.329** |

Table 4. Pre-1993 Summary Statistics and Coefficients
for the Control Variables- Continued.

| | | | | |
|--|--------|--------|----------|----------|
| | (0.50) | (0.53) | (0.47) | (2.76) |
| Some College | 0.23 | -0.027 | 0.29 | 0.241* |
| | (0.42) | (1.05) | (0.45) | (1.75) |
| Bachelor's or More | 0.19 | 0.027 | 0.34 | 0.494** |
| | (0.39) | (0.83) | (0.47) | (3.48) |
| Public Sector Law | 0.09 | -0.081 | 0.15 | -0.218** |
| | (0.29) | (1.58) | (0.36) | (2.59) |
| Family Income (000s) | - | - | 87.46 | 0.000 |
| | | | (128.84) | (0.02) |
| Health Limited Mother's Work | - | - | 0.04 | -0.147* |
| | | | (0.21) | (1.68) |
| Married in Birth Year | - | - | 0.99 | -0.568* |
| | | | (0.12) | (2.21) |
| Employer Offered Health Insurance | - | - | 0.83 | 0.068 |
| | | | (0.38) | (1.15) |
| Spousal Income (000s) | - | - | 47.14 | 0.000 |
| | | | (56.60) | (0.63) |
| Dad in HH | - | - | 0.99 | 0.227** |
| | | | (0.10) | (3.85) |
| Mother's Quarterly Earnings (000s) | - | - | 7.52 | 0.009 |
| | | | (4.39) | (1.58) |
| Covered by Union | - | - | 0.15 | -0.009 |
| | | | (0.36) | (0.11) |
| Ave Hours per Week Worked | - | - | 38.78 | -0.002 |
| | | | (8.14) | (0.60) |
| State HMO Enrollment ^c | 0.10 | 0.005 | 0.13 | -1.470 |
| | (0.08) | (0.01) | (0.07) | (0.67) |
| Medicaid Fee Ratio ^f | 0.44 | -0.151 | 0.43 | -0.167 |
| | (0.21) | (0.95) | (0.19) | (0.28) |
| N | 3082 | 3082 | 486 | 486 |

Standard deviations for the sample means in columns (1) and (3) are in parenthesis.

Z-statistics for the estimated coefficients are in parenthesis in columns (2) and (4).

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$.

Sampling weights were included when calculating sample means.

a. Occupation and industry controls as well as state and year dummies are included for the small sample but are not reported in the table. These results are available from the author.

b. Columns 2 and 4 present coefficient estimates on row variables from equation (1), while using "leave law" as the leave law variable. Coefficients are similar when other law variables are used. Equation (1): $CSECT = f(\alpha + \beta_1 X + \beta_2 Z + \beta_3 L + \beta_4 S + \beta_5 T + \epsilon)$

c. African American is the excluded category for race.

Table 4. Pre-1993 Summary Statistics and Coefficients
for the Control Variables- Continued.

- d. Those who did not complete high school are the excluded category for education.
 - e. Since HMO enrollment is not available for every year and every state, the sample size is limited to N= 2,957 when HMO enrollment is included as a control.
 - f. Since the Medicaid fee ratio is not available for every year and every state, the sample size is limited to N= 2,793 when the Medicaid fee ratio is included as a control.
-

Table 5. Entire Sample (1979-2000) Summary Statistics and Coefficient for Control Variables.

| | Large Sample | | Small Sample ^a | |
|------------------------------------|-------------------|---|---------------------------|---|
| | 1 | 2 | 3 | 4 |
| | Sample Mean | Estimated Coefficient for Equation (1) ^b | Sample Mean | Estimated Coefficient for Equation (1) ^b |
| Cesarean Delivery | 0.25 (0.43) | - | 0.30 (0.46) | - |
| Previous Cesarean | 0.10 (0.29) | 0.690** (22.45) | 0.12 (0.32) | 0.671** (7.80) |
| AFQT | 49.95 (26.35) | -0.001** (3.39) | 57.15 (25.13) | -0.002* (1.89) |
| Age of Mom | 26.75 (4.52) | 0.014** (3.79) | 29.62 (3.52) | 0.001 (0.12) |
| BMI Before Pregnancy | 23.13 (4.58) | -0.007** (2.48) | 23.76 (4.65) | -0.018* (1.86) |
| BMI at Delivery | 28.57 (4.78) | 0.017** (7.26) | 29.31 (4.77) | 0.034** (3.70) |
| White ^c | 0.73 (0.45) | 0.037 (1.38) | 0.76 (0.43) | 0.070 (1.02) |
| Hispanic | 0.06 (0.23) | 0.026 (0.68) | 0.06 (0.23) | 0.016 (0.23) |
| Native American | 0.04 (0.20) | 0.025 (0.64) | 0.03 (0.18) | 0.142 (0.89) |
| Asian | 0.01 (0.09) | 0.012 (0.20) | 0.01 (0.10) | 0.026 (0.20) |
| Other Race | 0.05 (0.21) | -0.001 (0.01) | 0.06 (0.24) | 0.037 (0.31) |
| Length of Child (inches) | 20.12 (1.59) | -0.008* (1.67) | 20.10 (1.52) | 0.008 (0.63) |
| Weight of Child (ounces) | 118.65 (20.99) | 0.001* (1.69) | 119.26 (21.49) | 0.002* (1.88) |
| Born Low Birth Weight | 0.07 (0.26) | 0.156** (4.05) | 0.08 (0.27) | 0.333** (2.75) |
| Gestation (weeks) | 38.65 (2.07) | 0.004 (1.01) | 38.44 (2.05) | -0.020* (2.02) |
| Received Prenatal Care by 3 months | 0.84 (0.37) | 0.006 (0.37) | 0.86 (0.35) | 0.003 (0.05) |
| Child Female | 0.49 (0.50) | -0.023 (1.28) | 0.48 (0.50) | -0.100* (1.67) |
| Birth Order | 1.69 (0.87) | -0.138** (11.33) | 1.74 (0.86) | -0.212** (5.61) |
| Multiple Birth | 0.02 (0.13) | 0.259** (2.45) | 0.03 (0.16) | 0.222 (1.05) |
| High School ^d | 0.44 | 0.001 | 0.31 | 0.063 |

Table 5. Entire Sample (1979-2000) Summary Statistics and Coefficients for Control Variables- Continued.

| | | | | |
|---------------------------------------|----------------|-----------------|-------------------|-------------------|
| | (0.50) | (0.06) | (0.46) | (0.71) |
| Some College | 0.22 | -0.035 | 0.26 | -0.035 |
| | (0.42) | (1.40) | (0.44) | (0.36) |
| Bachelor's or More | 0.22 | 0.006 | 0.37 | 0.027 |
| | (0.41) | (0.22) | (0.48) | (0.35) |
| Public Sector Law | 0.12 | -0.039 | 0.20 | -0.090 |
| | (0.32) | (1.26) | (0.40) | (1.10) |
| Family Income (000s) | - | - | 93.37 (141.10) | 0.000 (1.43) |
| Health Limited Mother's Work | - | - | 0.04 (0.18) | -0.152* (1.89) |
| Married in Birth Year | - | - | 0.98 (0.15) | -0.007 (0.05) |
| Employer Offered Health Insurance | - | - | 0.83 (0.37) | 0.046 (0.72) |
| Spousal Income (000s) | - | - | 48.00 (52.94) | 0.000 (0.45) |
| Dad in HH | - | - | 0.99 (0.08) | 0.190** (2.38) |
| Mother's Quarterly Earnings (000s) | - | - | 7.97 (6.02) | 0.002 (0.66) |
| Covered by Union | - | - | 0.13 (0.34) | -0.018 (0.23) |
| Ave Hours per Week Worked | - | - | 38.56 (8.43) | -0.002 (0.87) |
| State HMO Enrollment ^e | 0.12 (0.09) | 0.155 (0.40) | 0.15 (0.09) | -1.723 (1.55) |
| N | 3429 | 3429 | 625 | 625 |

Standard deviations for the sample means in columns (1) and (3) are in parenthesis.

Z-statistics for the estimated coefficients are in parenthesis in columns (2) and (4).

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$.

Sampling weights were included when calculating sample means.

a. Occupation and industry controls as well as state and year dummies are included for the small sample but are not reported in the table. These results are available from the author.

b. Columns 2 and 4 present coefficient estimates on row variables from equation (1), while using "leave law" as the leave law variable. Coefficients are similar when other law variables are used.
Equation (1): $CSECT = f(\alpha + \beta_1 X + \beta_2 Z + \beta_3 L + \beta_4 S + \beta_5 T + \epsilon)$

c. African American is the excluded category for race.

d. Those that did not complete high school are the excluded category for education.

e. Since HMO enrollment is not available for every year and every state, the sample size is limited to $N=3,269$ when HMO enrollment is included as a control.

Figure 2. Mean Cesarean Rate for States with and without Leave Laws, 1979-2000. (3-year moving averages)

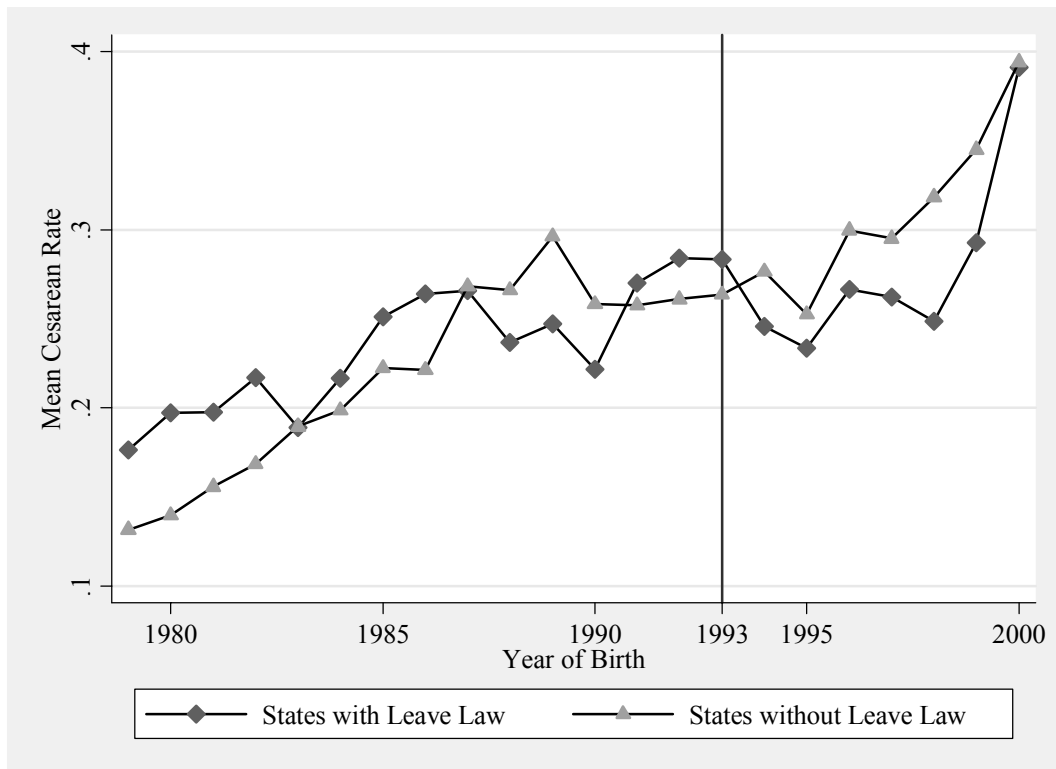


Table 6. Pre-1993 Probit Regression: Leave Law Impacts on Cesarean Section Rates.
(Dependent variable=1 if birth was by cesarean section)

| Law | (1) Large Sample | (2) Small Sample | (3) Small w/o Additional Controls |
|------------------------|------------------------|------------------------|--|
| any law | -0.079** (2.43) | -0.341** (5.80) | -0.267** (3.20) |
| leave law | -0.077* (1.73) | -0.244* (2.29) | -0.232** (2.51) |
| insure law | -0.070 (1.49) | -0.114 (0.78) | -0.114 (0.94) |
| parent law | -0.057 (1.13) | -0.128 (1.06) | -0.126 (1.19) |
| FMLA-like law | -0.059 (1.14) | -0.052 (0.33) | -0.061 (0.46) |
| N | 3082 | 486 | 486 |
| pseudo- R ² | 0.23 | 0.37 | 0.32 |
| Mean Csect Rate | 0.24 | 0.30 | 0.30 |

Z-statistics are in parenthesis.

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$

A separate probit regression is run for each of the law specifications. See Tables 2 and 3 for a description of the law specifications. The pseudo- R² is approximately the same when each law specification is used. Regressions also include controls for mother and child sociodemographics, income (for small sample), state fixed effects, and year fixed effects. Estimated coefficients for these variables are reported in Table 4.

Table 7. Percentage of the Population Enrolled in an HMO by State and Year.

| State | 1980 | 1985 | 1990 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| AL | 0.3 | 0.9 | 5.3 | 6.2 | 7.3 | 7.9 | 9.8 | 10.8 | 10.0 | 7.2 | 6.5 | 4.7 |
| AK | . | . | . | . | . | . | . | . | . | . | . | . |
| AZ | 6.0 | 10.3 | 16.2 | 22.5 | 25.8 | 29.0 | 28.8 | 30.3 | 32.0 | 30.9 | 32.4 | 25.8 |
| AR | . | 0.1 | 2.2 | 5.4 | 3.8 | 15.2 | 8.7 | 10.7 | 12.3 | 10.4 | 10.5 | 7.7 |
| CA | 16.8 | 22.5 | 30.7 | 33.7 | 36.0 | 40.3 | 43.8 | 47.1 | 52.1 | 53.5 | 53.4 | 50.5 |
| CO | 6.9 | 10.8 | 20.0 | 22.2 | 23.3 | 25.8 | 31.1 | 36.4 | 39.4 | 39.5 | 36.4 | 32.9 |
| CT | 2.4 | 7.1 | 19.9 | 21.2 | 21.2 | 29.8 | 34.7 | 42.9 | 38.8 | 44.6 | 39.7 | 38.3 |
| DE | . | 3.9 | 17.5 | 16.6 | 18.4 | 29.3 | 38.8 | 48.1 | 45.7 | 22.0 | 22.8 | 23.0 |
| DC | . | . | . | . | . | . | 34.1 | 33.0 | 33.7 | 35.2 | 31.0 | 31.2 |
| FL | 1.5 | 5.6 | 10.6 | 15.7 | 18.8 | 23.0 | 29.0 | 31.5 | 32.9 | 31.4 | 29.8 | 29.8 |
| GA | 0.1 | 2.9 | 4.8 | 6.7 | 7.6 | 9.4 | 12.7 | 15.5 | 16.2 | 17.4 | 15.9 | 15.2 |
| HI | 15.3 | 18.1 | 21.6 | 21.1 | 21.0 | 21.6 | 25.0 | 32.8 | 33.7 | 30.0 | 31.8 | 32.8 |
| ID | 1.2 | . | 1.8 | 1.1 | 1.4 | 3.7 | 4.3 | 5.7 | 6.4 | 7.9 | 4.3 | 2.9 |
| IL | 1.9 | 7.1 | 12.6 | 16.2 | 17.2 | 20.0 | 17.1 | 20.8 | 20.8 | 21.0 | 19.2 | 18.0 |
| IN | 0.5 | 3.6 | 6.1 | 7.4 | 8.3 | 9.9 | 11.9 | 14.0 | 13.2 | 12.4 | 11.7 | 10.7 |
| IA | 0.2 | 4.8 | 10.1 | 4.6 | 4.5 | 4.9 | 4.6 | 4.9 | 4.9 | 7.4 | 6.5 | 5.1 |
| KS | . | 3.3 | 7.9 | 5.2 | 4.7 | 6.3 | 11.5 | 14.4 | 16.8 | 17.9 | 16.1 | 13.2 |
| KY | 0.9 | 1.6 | 5.7 | 10.6 | 16.1 | 15.3 | 27.4 | 35.1 | 32.5 | 31.5 | 30.4 | 31.8 |
| LA | 0.6 | 0.9 | 5.4 | 7.5 | 7.2 | 11.0 | 14.7 | 16.6 | 17.7 | 17.0 | 15.6 | 14.0 |
| ME | 0.4 | 0.3 | 2.6 | 5.1 | 7.0 | 9.5 | 15.9 | 19.1 | 20.2 | 22.3 | 27.9 | 23.9 |
| MD | 2.0 | 4.8 | 14.2 | 24.5 | 29.5 | 30.9 | 38.0 | 43.6 | 46.0 | 43.9 | 38.4 | 34.7 |
| MA | 2.9 | 13.7 | 26.5 | 34.5 | 39.0 | 39.0 | 44.6 | 54.2 | 52.9 | 53.0 | 44.3 | 42.4 |
| MI | 2.4 | 9.9 | 15.2 | 18.3 | 20.5 | 22.2 | 23.5 | 25.3 | 27.0 | 27.1 | 26.7 | 25.5 |
| MN | 9.9 | 22.2 | 16.4 | 25.4 | 26.5 | 28.6 | 32.7 | 32.4 | 30.4 | 29.9 | 28.2 | 26.9 |
| MS | . | . | . | 0.1 | 0.7 | 1.2 | 2.4 | 3.6 | 3.2 | 1.1 | 0.9 | 1.4 |
| MO | 2.3 | 6.0 | 8.2 | 15.0 | 18.5 | 24.0 | 30.2 | 33.7 | 34.2 | 35.2 | 31.0 | 31.2 |
| MT | . | . | 1.0 | 1.6 | 2.4 | 2.9 | 3.1 | 3.9 | 6.6 | 7.0 | 7.7 | 5.8 |
| NE | 1.1 | 1.8 | 5.1 | 6.9 | 8.6 | 10.8 | 15.4 | 16.9 | 18.4 | 11.2 | 9.9 | 8.7 |
| NV | . | 5.8 | 8.5 | 11.9 | 15.9 | 18.7 | 20.8 | 26.8 | 23.5 | 23.5 | 20.4 | 22.4 |
| NH | 1.2 | 5.6 | 9.6 | 14.2 | 18.5 | 21.9 | 23.9 | 33.8 | 34.9 | 33.7 | 39.3 | 30.3 |
| NJ | 2.0 | 5.6 | 12.3 | 11.4 | 14.7 | 23.0 | 27.5 | 31.3 | 29.5 | 30.9 | 31.7 | 30.9 |
| NM | 1.4 | 2.0 | 12.7 | 12.7 | 15.1 | 15.5 | 21.0 | 32.3 | 38.1 | 37.7 | 27.9 | 29.0 |
| NY | 5.5 | 8.0 | 15.1 | 23.4 | 26.6 | 29.2 | 35.7 | 37.8 | 38.2 | 35.8 | 35.0 | 33.6 |
| NC | 0.6 | 1.6 | 4.8 | 6.7 | 8.3 | 11.1 | 14.6 | 17.1 | 18.8 | 17.8 | 16.3 | 14.8 |
| ND | 0.4 | 2.5 | 1.7 | 0.7 | 1.2 | 1.2 | 1.7 | 2.2 | 2.5 | 2.5 | 1.3 | 0.4 |

Table 7. Percentage of the Population Enrolled in an HMO by State and Year- Continued.

| | | | | | | | | | | | | |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| OH | 2.2 | 6.7 | 13.3 | 15.2 | 16.3 | 18.5 | 17.6 | 23.4 | 25.4 | 25.1 | 23.4 | 21.6 |
| OK | . | 2.1 | 5.5 | 7.1 | 7.6 | 10.3 | 12.4 | 13.8 | 14.2 | 14.7 | 13.9 | 14.8 |
| OR | 12.0 | 14.0 | 24.7 | 29.6 | 40.0 | 44.8 | 47.2 | 45.3 | 43.3 | 41.1 | 35.5 | 30.1 |
| PA | 1.2 | 5.0 | 12.5 | 18.3 | 21.5 | 27.4 | 29.9 | 37.1 | 33.6 | 33.9 | 33.4 | 31.2 |
| RI | 3.7 | 9.1 | 20.6 | 26.6 | 19.6 | 23.7 | 11.8 | 29.8 | 40.5 | 38.1 | 35.0 | 34.8 |
| SC | 0.2 | 1.0 | 1.9 | 3.6 | 5.5 | 9.0 | 8.4 | 9.9 | 10.0 | 9.9 | 9.5 | 8.0 |
| SD | . | . | 3.3 | 2.9 | 2.8 | 2.8 | 3.5 | 5.1 | 6.1 | 6.7 | 9.7 | 11.5 |
| TN | . | 1.8 | 3.7 | 11.0 | 12.2 | 13.9 | 15.3 | 24.1 | 37.7 | 33.0 | 33.0 | 18.6 |
| TX | 0.6 | 3.4 | 6.9 | 9.1 | 12.0 | 12.3 | 15.3 | 17.8 | 18.6 | 18.5 | 17.5 | 14.9 |
| UT | 0.6 | 8.8 | 13.9 | 23.4 | 25.1 | 30.1 | 40.7 | 35.6 | 35.2 | 35.3 | 35.5 | 32.0 |
| VT | . | . | 6.4 | 11.2 | 12.5 | 13.4 | . | . | 4.0 | 4.6 | 4.2 | 10.5 |
| VA | . | 1.1 | 6.1 | 7.2 | 7.7 | 8.7 | 15.7 | 16.9 | 19.6 | 18.5 | 16.2 | 15.9 |
| WA | 9.4 | 8.7 | 14.6 | 21.0 | 18.7 | 23.2 | 25.1 | 26.3 | 17.3 | 15.2 | 15.3 | 17.4 |
| WV | 0.7 | 1.7 | 3.9 | 4.1 | 5.8 | 7.0 | 9.4 | 10.7 | 10.5 | 10.3 | 10.9 | 10.0 |
| WI | 8.5 | 17.8 | 21.7 | 22.4 | 24.0 | 27.6 | 24.9 | 30.8 | 30.9 | 30.2 | 29.6 | 29.3 |
| WY | . | . | . | . | . | . | 0.4 | 0.7 | 1.2 | 1.4 | 1.7 | 2.0 |

Table 8. Ratio of Medicaid to Private Ob/Gyn Fees for 1979, 1986, and 1992 by State.

| State | 1979 | 1986 | 1992 |
|--------------|-------------|-------------|-------------|
| AL | 0.48 | 0.44 | 0.59 |
| AR | 0.94 | 0.59 | 0.59 |
| CA | 0.35 | 0.30 | 0.37 |
| CO | 0.24 | 0.27 | 0.41 |
| CT | 0.22 | 0.20 | 0.35 |
| DE | 0.79 | 0.51 | 0.57 |
| DC | 0.18 | 0.19 | 0.35 |
| FL | 0.32 | 0.27 | 0.51 |
| GA | 0.44 | 0.56 | 0.74 |
| HI | 0.65 | 0.38 | 0.38 |
| ID | 0.73 | 0.59 | 0.94 |
| IL | 0.44 | 0.42 | 0.56 |
| IN | 0.97 | 0.90 | 0.79 |
| IA | 0.67 | 0.90 | 0.80 |
| KS | 0.57 | 0.40 | 0.98 |
| LA | 0.54 | 0.41 | 0.54 |
| ME | 0.38 | 0.25 | 0.61 |
| MD | 0.27 | 0.23 | 0.52 |
| MA | 0.13 | 0.26 | 0.40 |
| MI | 0.43 | 0.30 | 0.34 |
| MN | 0.83 | 0.58 | 0.75 |
| MS | 0.50 | 0.55 | 0.56 |
| MO | 0.61 | 0.26 | 0.63 |
| MT | 0.68 | 0.61 | 0.57 |
| NE | 0.96 | 1.12 | 0.82 |
| NV | 0.93 | 0.62 | 0.95 |
| NH | 0.50 | 0.27 | 0.75 |
| NJ | 0.20 | 0.13 | 0.15 |
| NM | 0.69 | 0.42 | 0.60 |
| NY | 0.11 | 0.22 | 0.25 |
| NC | 0.68 | 0.43 | 0.63 |
| ND | 0.81 | 0.51 | 0.61 |
| OH | 0.65 | 0.42 | 0.45 |
| OK | 0.84 | 0.91 | 0.61 |
| OR | 0.36 | 0.37 | 0.54 |
| PA | 0.17 | 0.10 | 0.32 |
| SC | 1.31 | 0.70 | 0.93 |
| SD | 0.36 | 0.36 | 0.38 |
| TN | 0.69 | 0.67 | 0.42 |
| UT | 0.62 | 0.46 | 0.38 |
| VT | 0.67 | 0.55 | 0.89 |
| VA | 0.46 | 0.30 | 0.61 |

Table 8. Ratio of Medicaid to Private Ob/Gyn Fees for 1979, 1986, and 1992 by State- Continued.

| | | | |
|-----------|------|------|------|
| WA | 0.39 | 0.40 | 0.55 |
| WV | 0.37 | 0.22 | 0.65 |
| WI | 0.76 | 0.81 | 0.69 |

Table 9. Pre-1993: Robustness Checks for the Large Sample.
 (Dependent variable=1 if birth was by cesarean section)

| Law | (1) HMO & Medicaid controls | (2) Post-1985 Births | (3) Hours of Work Requirement |
|------------------------|--------------------------------------|----------------------------|-------------------------------------|
| any law | -0.100** (3.20) | -0.125** (3.83) | -0.084** (2.82) |
| leave law | -0.103** (2.33) | -0.128* (2.06) | -0.08* (1.95) |
| insure law | -0.093* (1.97) | -0.07 (1.13) | -0.05 (0.81) |
| parent law | -0.069 (1.43) | -0.031 (0.52) | -0.041 (0.67) |
| FMLA-like law | -0.068 (1.33) | -0.017 (0.26) | -0.036 (0.52) |
| N | 2619 | 1766 | 2616 |
| pseudo- R ² | 0.23 | 0.24 | 0.23 |

Z-statistics are in parenthesis.

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$.

A separate probit regression is run for each of the law specifications. The pseudo- R² is approximately the same when each law specification is used. Regressions also include controls for mother and child sociodemographics, income (for small sample), state HMO enrollment and Medicaid fee ratios over time, state fixed effects, and year fixed effects. Estimated coefficients for these variables are reported in Table 4.

Table 10. Pre-1993: Robustness Checks for the Small Sample.
 (Dependent variable=1 if birth was by cesarean section)

| Law | (1) HMO & Medicaid controls | (2) Post-1985 Births | (3) Hours of Work Requirement |
|------------------------|--------------------------------------|----------------------------|-------------------------------------|
| any law | -0.329** (3.19) | -0.348** (3.09) | -0.250** (2.35) |
| leave law | -0.273** (2.33) | -0.287* (2.25) | -0.173 (1.42) |
| insure law | -0.125 (1.04) | -0.136 (1.07) | -0.051 (0.45) |
| parent law | -0.145 (1.37) | -0.149 (1.38) | -0.117 (1.11) |
| FMLA-like law | -0.069 (0.55) | -0.072 (0.56) | -0.051 (0.42) |
| N | 429 | 421 | 429 |
| pseudo- R ² | 0.4 | 0.4 | 0.4 |

Z-statistics are in parenthesis.

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$.

A separate probit regression is run for each of the law specifications. The pseudo- R² is approximately the same when each law specification is used. Regressions also include controls for mother and child sociodemographics, income (for small sample), state HMO enrollment and Medicaid fee ratios over time, state fixed effects, and year fixed effects. Estimated coefficients for these variables are reported in Table 4.

Table 11. Pre-1993: Robustness Check for the Sample of Mothers Not Working.
(Dependent variable=1 if birth was by cesarean section)

| Law | (1) Not Working |
|------------------------|-----------------------|
| any law | -0.108* |
| | (2.16) |
| leave law | -0.02 |
| | (0.48) |
| insure law | -0.044 |
| | (0.67) |
| parent law | 0.005 |
| | (0.09) |
| FMLA-like law | -0.001 |
| | (0.01) |
| N | 1531 |
| pseudo- R ² | 0.36 |

Z-statistics are in parenthesis.

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$.

A separate probit regression is run for each of the law specifications. The pseudo- R² is approximately the same when each law specification is used. Regressions also include controls for mother and child sociodemographics, income (for small sample), state HMO enrollment and Medicaid fee ratios over time, state fixed effects, and year fixed effects.

Table 12. Entire Period (1979-2000) Probit Regression: Federal Leave Law Impacts on Cesarean Section Rates.
(Dependent variable=1 if birth was by cesarean section)

| Law | (1) Large Sample | (2) Large w/HMO control | (3) Small Sample | (4) Small w/HMO control |
|------------------------|------------------------|----------------------------------|------------------------|----------------------------------|
| FMLA | 0.035 (0.64) | 0.033 (0.57) | 0.030 (0.32) | 0.039 (0.44) |
| N | 3429 | 3269 | 625 | 625 |
| pseudo- R ² | 0.24 | 0.24 | 0.31 | 0.32 |
| Mean Csect Rate | 0.25 | | 0.30 | |

Z-statistics are in parenthesis.

* Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$

Regressions also include controls for mother and child sociodemographics, income (for small sample), state HMO enrollment over time (columns 2 and 4), state fixed effects, and year fixed effects. Estimated coefficients for these variables are reported in Table 5.

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