What a Difference a Day Makes: Quantifying the Effects of Birth Timing Manipulation on Infant Health

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Abstract Scheduling births for non-medical reasons has become an increasingly common practice in the United States and around the world. We exploit a natural experiment created by child tax benefits, which rewards births that occur just before the new year, to better understand the full costs of elective c-sections and inductions. Using data on all births in the U.S. from 1990 to 2000, we first confirm that expectant parents respond to the financial incentives by electing to give birth in December rather than January. We find that most of the manipulation comes from changes in the timing of c-sections, and that this has significant health consequences for the infants. Specifically, for every $1000 increase in tax savings, 2.5 additional infants per 1,000 c-sections are born of low birthweight.

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1 Introduction

Over the past 30 years, the United States has seen a dramatic change in the way that both doctors and parents approach labor and delivery. An increasingly larger fraction of births is being scheduled at times that are more convenient for doctors or parents (Gans & Leigh 2008, Gans et al. 2007, Lo 2003). Inductions, stimulations, and cesarean sections (both elective and non-elective) are becoming more common. In 2007, c-sections accounted for 32 percent of all births in the U.S, while 23 percent of all births in the U.S. were induced, up from 21% and 8.5%, respectively, in 1989.[1] Although some believe the higher c-section rate is a reflection of an increase in the number of women who genuinely need a cesarean, medical researchers consider the optimal, medically necessary c-section rate to be around ten percent (Joffe et al. 1994). The high rates of c-sections, inductions, and scheduled births have alarmed some health professionals, expectant mothers, and policy-makers. In Healthy People 2010, the U.S. government outlined a goal of reducing the rate of c-sections among low-risk women by 2010.[2] Instead, the cesarean section rate *increased* during the decade, even among low-risk women. As a result, the government has restated the same goal in Healthy People 2020. At the local level, some hospitals and clinics have set smaller-scale goals to decrease the prevalence of c-sections, inductions, and elective birth timing manipulation (Perkes 2010, Langrew & Morgan 1996, Landro 2011). However, there are those who support the current trend, arguing in favor of the convenience that c-sections and inductions offer mothers and doctors (**?**). Their consequences on the health of the newborn, when used for non-medical reasons, have not been assessed.

To better understand the full costs of elective c-sections and inductions scheduled for the personal gain of the parents, we exploit a natural experiment created by the U.S. income tax system –

[1]Induction status is unknown for 1.2% of births in 2007 and for 5.5% of births in 1989.

[2]Healthy People is a 10-year plan, now in its third round, aimed at improving the health of Americans.

the child tax benefit. A parent can claim a new child on their yearly income taxes if the child was born anytime within the calendar year.[3] This strict rule gives parents who are expecting a child at the beginning of January a financial incentive to time the birth at the end of December instead. Although this may seem "extreme" to some parents, there is both anecdotal and statistical evidence showing that the timing of births is altered in order to receive the maximum financial benefit.[4] Countless stories document that the tax benefit is on the minds of many expectant parents; on pregnancy forums, mothers-to-be talk openly about wanting December babies and how they were able to persuade their doctors to schedule a December birth.[5] Dickert-Conlin & Chandra (1999) find that an additional $500 in tax benefits increases the probability of having a child in the last week of December versus the first week of January by 26.9 percent. In addition, there is evidence that other personal decisions are responsive to tax incentives. Both Sjoquist & Walker (1995) and Alm & Whittington (1995) find that a higher marriage tax penalty increases the probability of a couple

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[3]If a child is born on December 31, 2010, he can be claimed as dependent beginning on his parents' 2010 taxes. However, a child born on January 1, 2011 can be claimed starting in 2011. Children are claimed on parents' taxes every year they are a dependent. Thus, having a child born at the end of the year gives parents an additional year of tax benefits.

[4]Because health insurance deductibles and health savings accounts often reset at the beginning of the year, some parents have an additional incentive to schedule their births in December.

[5]For example, from Baby Community Center, posted October 6, 2010:
"My Dr. told me she wont let me go past 38 weeks (January 7) but I'm hoping to deliver in December for two reasons...
1. Taxes
2. I have a high deductible insurance plan. I've met my deductible for the year, so everything from now on until December 31 will be covered 100%. After January 1, my $5600 deductible refreshes!"

delaying marriage from the last quarter of one year to the first quarter of the next year.[6] There is also evidence that the timing of death is responsive to changes in tax consequences (Kopczuk & Slemrod 2003, Gans & Leigh 2006*b*).

In this study, we exploit the natural experiment created by the strict timing requirement for tax benefits, as well as exogenous variation in the generosity of child tax benefits during the 1990s, to investigate the mechanisms through which women alter their birth timing and whether these mechanisms can affect the health of the newborn. Using data from the Vital Statistics on the universe of all births in the United States from 1990 to 2000, in addition to census income data to estimate the size of tax benefits, we first verify that expectant mothers are in fact manipulating the timing of their births in order to gain additional tax benefits. We then assess the mechanisms through which women are altering their births; through shifting the timing of inevitable cesarean sections and inductions or by forcing a c-section or induction in December when a vaginal birth would have occurred in January. Finally, an important contribution of the paper is that we explore the effects of birth timing manipulation on the health of the newborn.

Our results complement those of Dickert-Conlin & Chandra (1999), supporting their finding that larger child tax benefits are associated with a higher chance of being born in December relative to the adjacent January. Our paper is the first to confirm Dickert-Conlin & Chandra (1999)'s assumption that most of this effect results from shifts in inevitable c-sections from January to December. We also find that manipulation in the timing of births results in a larger proportion of babies who are of low birthweight. Since this outcome is associated with many short- and long-term consequences, our findings suggest that doctors and parents should use extreme caution when scheduling a birth for non-medical reasons before the natural arrival of the baby.

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[6]A couple that is married anytime within a year must claim themselves as married when filing their taxes for that year. Those who delay their marriage until the new year are able to avoid the marriage tax penalty on one additional year of income taxes.

2 Child Tax Benefits in the United States

Like many other countries, the United States offers subsidies to families based on the number of children they have, with the goal of helping to offset the cost of raising children. In the U.S. these subsidies work through the income tax system and have been evolving over time. There are different channels through which child tax benefits operate: the Earned Income Tax Credit, dependent exemption, child tax credit, dependent care credit, and education benefits. For this study, we focus on the first three, as they are the most widely claimed and offer the most substantial benefits.

The dependent exemption is the broadest of the child credits, including older children and higher income families as well. The exemption is available for any child under 19 and any full-time student under 24 for whom the family provides over half of the support. The dependent exemption reduces a family's tax liability by lowering their taxable income. The value of the exemption to the family depends both on the amount of the exemption and the marginal tax rate the family faces. Because of this, the dependent exemption is largest for the wealthiest families facing the highest marginal tax rates. For example, in 1999, the dependent exemption was $2,750 per dependent. For families in the 15 percent tax bracket, the benefit was worth $413 in tax savings, but for families in the 31 percent tax bracket, it was worth $853.[7]

The Child Tax Credit, established in 1997, allows families with children a credit against their federal income tax for each qualifying child. The credit was initially $400 for each child, but has increased gradually to $1,000. To qualify for the credit, the child must be under the age of 17 and live with the claiming parent for more than half the year. The credit begins phasing out at moderately high income levels.[8] Unlike the dependent exemption, the Child Tax Credit is a direct reduction in a family's tax liability, not just a deduction from taxable income. The credit is also

[7] $2{,}750 \times 0.15 = 412.5$; $2{,}750 \times 0.31 = 852.5$

[8] Specifically, the phase-out begins at $110,000 for parents who are married filing jointly,

partially refundable.

The Earned Income Tax Credit (EITC) was first introduced in 1975 as an earnings subsidy for low-income families with children. The EITC has been expanding over the decades, with its largest overhaul occurring in the early 1990s. Unlike the other credits, the EITC is fully refundable and its benefits are more generous, in terms of percent of earnings refunded, for those with lower income. In its most generous phase, earnings are matched by an EITC equal to 34 percent of earnings for a family with one child, and 40 percent for a family with two children. For example, in 1999, the credit's maximum was $2,312 for a family with one child and $3,816 for a family with two or more children. The EITC begins to phase out at a family income of $12,460. The EITC offers a large subsidy for children in low income families, especially as a proportion of the family's income.

The biggest changes in the tax treatment of children came in the 1990s, because of both the introduction of the Child Tax Credit in 1997 and the expansions of the EITC in 1990 and 1993. We exploit this exogenous variation in tax liability to identify the impact of tax benefits on the timing of births. This allows us to examine the mechanism through which parents manipulate birth timing and to identify the causal effect of birth timing manipulation on infant health.

The size of a family's tax benefit for an additional child varies by income, state, year, marital status and how many children they already have. Figures 1 and 2 show how the size of tax benefits varies by income for married couples and single mothers, respectively. The graph in panel (A) shows how the size of the benefit varies by income for a family having their first child. The other three graphs show the same relationship, but for families having their second, third or fourth child. The variation in benefits within income level in each graph comes from yearly variation in tax policy. There is some additional variation by state, but it is not shown in these graphs.[9] For

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$55,000 for married filing separately, and $75,000 for all others (for tax year 2008)

[9]Some states offer state income tax relief for families with children. These benefits are generally quite small.

families having their first or second child, the largest savings come at lower income levels, while savings increase with income for families having their third or fourth child. An analysis of variance shows that most of the variation in the magnitude of the tax benefit is generated by variation across birth order and year.

3 Previous Studies

3.1 Financial Incentives and the Timing of Births

Dickert-Conlin & Chandra (1999) first examined the extent to which tax benefits shift births from the first week of January to the last week of December using the National Longitudinal Survey of Youth (NLSY). They find that a $500 increase in tax benefits increases the probability of having a child in the last week of December by 26.9 percent. Our study focuses on the health consequences of this manipulation. In order to do so, we use Vital Statistics data, which includes information on the type of delivery and health measures of the newborn. This allows us to determine the mechanisms through which mothers are altering the timing of their births and to assess the health consequences of these actions.

The first part of our study confirms that Dickert-Conlin & Chandra (1999)'s results hold up in this dataset, although the magnitudes of our point estimates are much smaller. There are several notable differences between the Dickert-Conlin & Chandra (1999) study and the first stage of ours. First, because they use the NLSY their sample is limited to 170 births. In contrast, our Vital Statistics analysis is based on the universe of births between 1990 and 2000. In addition, Dickert-Conlin & Chandra (1999) exploit tax benefit variation during the 1980's and early 90's, when benefits were less generous. Because we use more recent data, we are able to leverage the variation in benefits brought forth by the 1990's expansions of the EITC and the Child Tax Credit. This is particularly useful variation because it is not always an increasing function of income, as it almost exclusively was in the 1980s. This is of particular importance if we are concerned that higher income individuals are more likely to alter the timing of their child's birth, independent of the financial benefit of doing so. If child tax benefits simply increase with income and those with higher income are more likely to alter birth timing, the estimate of the effect of tax benefits on birth timing would be biased upward. The non-linear relationship between income and tax benefits in the 1990s tax code allows us to eliminate this bias.

In a related paper, Gans & Leigh (2009) explore how the 2004 Australian Baby Bonus affected the timing of births. The one-time bonus, worth approximately $2,250 USD, was announced just seven weeks before its introduction, when the treatment group was already in their third trimester of pregnancy. They estimate that over 1,000 births were moved to a later date to ensure that the parents would receive the bonus. Most of the effect was due to changes in the timing of cesarean sections and inductions. Babies whose births were shifted to be eligible for the bonus were more likely to be of higher birth weight. Because the bonus was offered to babies born *after* a certain date, those altering their date of delivery were almost entirely those originally planning a c-section or induction. Of course, women who naturally went into labor before the bonus date could not opt to wait. Using the year-end cutoff of the U.S. tax benefit system allows us to see how all expectant mothers react to such incentives, and whether they "switch" their delivery method in order to ensure benefit receipt. We are also able to leverage variation in the size of benefits, rather than examining a flat benefit.

A similar result was found by Neugart & Ohlsson (2010) in Germany when the government changed its parental benefit system. Expectant mothers who were working would receive more generous maternity benefits if their child was born on or after January 1, 2007. The policy change increased economic incentives for women to postpone delivery, provided they were employed. They found that employed women near the end of their term were shifting their births to the new year so they could benefit from the new, more generous parental benefit system. There was no change in birth timing for mothers who were not employed and would not benefit from the policy change. This study has a limited treatment group – working women. This group of women may be more aware of such benefits and also more comfortable bargaining with their doctors to change their delivery date. Thus, these results may not be applicable to the average woman.

We make four important contributions to the current literature. First, by using the Vital Statistics, our study includes the universe of all births that occurred in the U.S. during our time period. Thus, we examine how the tax benefits affect the behavior of mothers of different demographic groups. Second, by focusing our analysis on the 1990s, we are able to exploit the large variation in tax benefits caused by the Earned Income Tax Credit and the Child Tax Credit. Third, we determine the mechanisms through which birth timing manipulation is occurring. Lastly, and perhaps most importantly, we assess the health consequences to the newborn of elective birth timing changes. Although the current literature has been able to establish that parents respond to financial incentives in the timing of their child's birth, they have not determined what the costs of this behavior are in terms of the health of the child. To our understanding, we are the first study to do so.

3.2 Manipulating the Timing of Births

The advancement of medicine has allowed patients and doctors increased discretion over the timing of births. Cesarean sections allow doctors to deliver babies days (sometimes weeks) before they would have been born naturally. Labor can also be induced using a combination of drugs that first dilate the cervix (Cervidil or Cytotec) and then contract the uterus (Pitocin) (Block 2008).

Unfortunately, not all women are well-informed about the consequences of elective labor induction or c-sections. Induced labors tend to be more difficult and painful and they increase a woman's chance of having a c-section by two to three times (Block 2008).[10] A c-section is major

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[10]Pitocin creates contractions that are stronger and more frequent than those produced naturally by the body; this can lead to hyperstimulation of the uterus – contractions that come too hard and too fast– which can cause oxygen deprivation for the fetus. If the baby is not delivered quickly, a c-section is needed to remove the baby before its oxygen levels drop too low.

surgery and brings with it its own set of risks and complications: infection, hemorrhage, injury to organs, scar tissue formation inside the pelvic region, and extended recovery time. Babies born by cesarean are at higher risk for breathing problems, low Apgar scores, and fetal injury, as they may be nicked or cut during the incision.[11]

Although the altering of birth timing is often done for medical reasons, there is substantial evidence that birth timing is sometimes manipulated for reasons other than the health of the fetus or mother. A study of patients undergoing repeat cesarean sections found that of the 24,077 repeat cesarean deliveries at term observed, over half were performed electively; of these, 35.8% were performed before 39 completed weeks of gestation (Nita et al. 2009). Doctors often schedule c-sections at convenient times; far fewer babies are born on Saturdays and Sundays than on weekdays. In fact, throughout the 1990's, birthrates were approximately 30 percent higher on weekdays compared to weekends. Gans & Leigh (2008) find that nearly one-third of U.S. and Australian babies who would have been born on a weekend were "moved" to a weekday. They conclude that increases in cesarean sections and inductions account for around four-fifths of the shift away from weekend births. Also using data from Australia and the U.S., Gans et al. (2007) find that there are fewer births on the days of the annual obstetricians and gynecologists' conferences. There is, alternatively, a rise in births prior to the conferences, suggesting that physicians are shifting the births earlier to accommodate their schedules.

Parents may also want to shift the timing of their child's birth. For instance, in Taiwan some people believe that date of birth determines much of a child's fate; thus, they ask for their child's birth to be scheduled on particular days (Lo 2003). Using data from Australia, Gans & Leigh (2006*a*) estimate the bargaining power that parents have over the timing of the birth of their children by exploiting the fact that parents are averse to having their children born on February 29 and April 1. Since physicians are not averse to working on those days, unless those days fall on

[11] Source: American Pregnancy Association

a weekend, they examine what happens when parents' desire to avoid those birth dates conflicts with doctors' desire to avoid working on a weekend. Their results suggest that in approximately three-fourths of cases, the physician's views prevail over those of the patient. Although most of the power rests with the doctors, parents win in approximately one-quarter of the cases. This suggests that parents are often willing and able to alter their delivery dates.

4 Data

We use data on the universe of all births in the United States from 1990-2001 from the National Center for Health Statistics' Vital Statistics Natality Files. These data are constructed using birth certificate information from each state, and include demographic characteristics of the mothers and detailed information about the birth. Specific to our study, the data include information on the month and year of birth, how the child was delivered, and a handful of health measures for the newborn.

One limitation of the Natality data is that it does not include any information on family income, which is essential for determining the potential financial benefit of having a baby in December versus January. Because of this, we employ a cell-level analysis and estimate tax benefits by cell. Each cell is defined at the state/year/race/mother's education/mother's age/marital status/parity level. Each cell includes observations from births that occur in December and its adjacent January.[12] We include all 50 states and the District of Columbia and all whites and blacks.[13] Mother's education is categorized as less than high school degree, high school degree, and college degree

[12]Although the months of interest span across two separate years, we assign each cell the year the December was in.

[13]Hispanics are included in these race categories. Black Hispanics as black and white Hispanics as white.

or more. We limit our sample to mothers between the ages of 20 and 45, and group mother's age into five year age intervals. Marital status is assigned according to whether the mother is married or single at the time of birth. Finally, we define parity as the number of children the mother has, including the new birth. We limit our sample to families with four or fewer children in order to avoid the idiosyncrasies of especially large families. We also exclude cells that are composed of fewer than 10 mothers. With such few births in the cell, small changes in birth outcomes are reflected as large percentage changes. Although we weight our estimates by cell size, small cells are particularly problematic when stratifying our estimate by demographic group where most of the cells are composed of relatively few mothers. However, our main results are not affected by excluding the small cells.

Our infant health outcomes of interest are birthweight and Apgar score. We use these outcomes for three main reasons. First, they both are reported for nearly all births. This allows us the statistical power necessary to determine the effects of timing changes. Second, since they are both continuous variables, we can observe marginal changes in the newborns' health. Lastly, they are both strong indicators of overall health, and can reflect health problems not observed in our data. Important developmental gains are made in the final weeks of gestation that would be reflected in birthweight and Apgar score. For instance, the lungs and liver are not fully developed until 36 to 38 weeks, and even when fully developed, they continue to strengthen during the final week(s).[14] Basic weight gain is also an important part of the final weeks of fetal development. In the third trimester, babies gain an average of 225 grams per week (The American College of Obstetricians and Gynecologists 2010).

In addition to looking at effects on mean and median birthweight, we consider whether or not the newborn is classified as low birthweight. Low birthweight babies are those less than 2500 grams. The Apgar score comes from a test given five minutes after birth that quickly assesses

[14]Source: March of Dimes. Scientific source is pending.

the infant's health through activity, pulse, grimace (reflex irritability), appearance, and respiration. Each category is scored from 0 to 2. A total score between 7 and 10 is generally considered normal.

We derive income estimates for each cell using the 1990 5% Public-Use Census to calculate the average total family income by cell. In order to exploit variation in the generosity of tax benefits over time, rather than potentially endogenous variation in cross-sectional income growth, we hold income fixed in real terms by adjusting the 1990 income estimates for inflation and using those income estimates for 1991-2000.[15] This is a common strategy in the public finance literature, and is used in order to avoid endogenous changes in income due to tax structures (Medicaid expansions: Gruber 2005; EITC: Meyer & Rosenbaum 1999).

We use NBER's TAXSIM to calculate yearly tax liabilities based on income, filing status (single, married, or head of household), and number of dependents. To determine the financial benefit of having a birth in December instead of January, we find the difference between the tax liability without and with an additional dependent for each census observation. We then average the benefit of the December birth by cell and assign the average benefit to the cells in the Natality data. If a mother is listed as married, we assume she files her taxes with her husband. If she is single, we assume that her filing status is "single" when she has no children, but changes to "head of household" once she has at least one child.

Table 1 presents the summary statistics, weighted by the number of births in the cell (line 4). We can see that the average savings is approximately $650. While this is approximately 1.5% of the average income level, the largest savings are found at the lowest income levels. This means that the average savings as a percentage of income is close to 3%. Table 2 shows some of the variables that are used to construct the dependent variables, separately for December and January. Column

[15]We are most concerned that changes in the child tax benefits led to changes in family income. Particularly with the EITC, small adjustments in income could lead to larger benefits. The annual inflation measures are from the Bureau of Labor Statistics.

3 shows the difference in means. While the differences in the mean characteristics of December and January births are not very large, nearly all of the differences are statistically significant. This might partly be a result of our natural experiment, as these are the differences we are analyzing. In addition, there is strong evidence of seasonality in the types of women who give birth at different times of the year (Buckles & Hungerman 2008). That is, the average woman who gives birth in January may be different than the average woman who gives birth in December. In our estimation, we are careful to control for demographic characteristics, as well as demographic-specific time trends so that seasonality does not contaminate our results.

5 Estimation and Results

5.1 Timing Manipulation

In order to estimate the effect of more generous tax incentives on the decision to manipulate birth timing, and the mechanisms through which this manipulation occurs, we estimate equation 1.

$$\text{Diff}_{dtsp} = \alpha + \beta \text{ TaxBenefit}_{dtsp} + \delta_p \text{Inc}_p + \phi_d + \phi_t + \phi_s + \phi_p + \tau_d + \epsilon_{dtsp} \quad (1)$$

where TaxBenefit_{dtsp} is the financial tax benefit associated with a December birth relative to a January birth, in thousands of dollars[16] for demographic group d in year t and state s at parity p. Demographic group is defined by age, education, race and marital status.[17] The coefficient of interest is β, which measures the effect of a one thousand dollar increase in child tax benefits on the outcome variable.

[16]Dollar values are indexed to the year 2000.

[17]There are 60 demographic groups: 5 age groups $\times$ 3 education groups $\times$ 2 races $\times$ 2 marital statuses.

Inc_p is a vector that includes income interacted with parity. We include these interaction terms, rather than one linear control for income, because of income's differential effect on child tax benefits by parity. ϕ_d, ϕ_t, ϕ_s and ϕ_p are vectors of fixed effects for demographic group, year, state and parity, respectively. τ_d is a vector of linear time trends for each demographic group. We include the demographic group fixed effects in order to control for differences in preferences and to make sure our our results are not driven by seasonality in births that vary across demographic groups. Additionally, we include a linear time trend for each demographic group to control for changes in the prevalence of birth timing manipulation by demographic group as well as changes in seasonality over time. Regressions are weighted by the number of births in December and January for that cell. Standard errors are clustered by state–year, because much of the variation in tax policy occurs at this level.[18]

We estimate equation 1 using three dependent variables in order to determine whether birth timing and/or delivery methods are manipulated in response to the child tax benefits. We address two different types of manipulation: "shifting" and "switching." We define "shifting" as the decision to schedule a c-section or induction in December, rather than in January. In this case, the type of delivery remains unchanged, but occurs earlier than it would have in the absence of the tax benefits. "Switching" is defined as a change in the type of delivery. In this case, what would have been a traditional vaginal delivery is switched to a different type in order to ensure a December delivery. Both types of manipulation may have health consequences for the newborn, which will be addressed in section 5.2.

The first dependent variable, Total Diff_c, measures the percent difference between the number of births in December and the following January, where c indicates a cell defined by demographic group, year, state and parity. Any births that *shift* from January to December will lead to an increase

[18]Alternatively, we have clustered on year–parity and year–state–parity, and this does not substantively change our results.

in this variable. This allows us to assess whether birth timing is manipulated.

$$\text{Total Diff}_c \quad = \quad \frac{\text{\# Dec. Births}_c - \text{\# Jan. Births}_c}{\text{\# Jan. Births}_c} \times 100 \tag{2}$$

The second dependent variable, C-Sec Diff$_c$ (or Induct Diff$_c$), measures the percent difference between the number of c-sections in December and the following January. Any c-sections that *shift* from January to December will lead to an increase in this variable. This variable allows us to confirm that the shifting happens through the most likely channel: scheduling c-sections earlier.

$$\text{C-Sec Diff}_c \quad = \quad \frac{\text{\# Dec. C-Sec}_c - \text{\# Jan. C-Sec}_c}{\text{\# Jan. C-Sec}_c} \times 100 \tag{3}$$

The third dependent variable, C-Sec Share$_c$ (or Induct Share$_c$), measures the percent difference in c-sections as a share of total births in the affected months– December and January– compared to the share of c-sections in a set of comparison months. The comparison months are the ten months preceding December and the ten months following January. This allows us to see whether, in addition to moving c-sections earlier, the c-section rate is affected by child tax benefits.

$$\text{C-Sec Share}_c = \frac{\text{\% C-Sec Dec \& Jan}_c - \text{\% C-Sec Comparison Months}_c}{\text{\% C-Sec Comparison Months}_c} \times 100 \tag{4}$$

where

$$\text{\% C-Sec} = \frac{\text{\# C-Sec}_c}{\text{\# Births}_c} \times 100 \tag{5}$$

This variable does not capture shifts from January to December, as these two months are added together. Rather, it captures differences in the c-section rate between the months affected by child tax benefits and the months unaffected by the benefits. Vaginal births that are *switched* to c-sections will cause % C-Sec Dec & Jan$_c$ to increase. This will cause an increase in C-Sec Share$_c$. We show a numerical example that illustrates this in the appendix.

Table 3 presents our estimations from equation 1. Column one shows that an additional $1,000 in tax benefits causes the percent difference between December and January births to increase by 1.6 percentage points. This estimate suggests that roughly eight babies per thousand are shifted. For example, a cell that would have consisted of 1,000 babies born in December and 1,000 born in January would change to 1,008 in December and 992 in January. This increases the dependent variable from 0% to 1.6%.[19]

Columns two and three complete the picture focusing on c-sections, and suggest that the estimate in column one is largely driven by the shifting of c-sections. The results in column two show that for an additional $1,000 in tax benefits, the percent difference between the number of c-sections that occur in December and January increases by 5.1 percentage points. This means that on average, for every 1,000 c-sections, 25 are shifted from January to December for a $1000 increase in benefits. Since c-sections account for 24% of all births, of the 8 births that shift to December, 6 of those are from c-sections. The estimate in Column (3) is positive, as would be expected if the manipulation caused more c-sections overall. However, it is not statistically different from zero, so the evidence for switching is not as strong as it is for shifting.

Columns four and five suggest that some of this change might be achieved through manipulation of inductions. While the coefficients of interest are not statistically significant in either column, the positive coefficient in column four suggests that higher tax benefits translate into earlier inductions. Using the point estimate in column 4, we estimate that the remaining 2 of the 8 shifted births can be accounted for by shifted inductions. The estimate in column five is also positive, as expected.

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[19]This estimate is statistically significant, but much smaller in magnitude than those produced by Dickert-Conlin & Chandra (1999), who find that an additional $500 in tax benefits causes approximately 269 babies per thousand to shift from the first week of January to the last week in December. We can compare our results to theirs by scaling our estimate up by four to account for the fact that we look at the entire month, whereas they look at the one week in which we'd expect most of the shifting to be occurring. We then divide by two to look at the effect of a $500 increase in benefits rather than a $1,000 increase. Our estimates suggest that only 16 births per thousand would be shifted to the last week of December. Our results are significantly smaller than those produced by Dickert-Conlin & Chandra (1999). This difference likely reflects the fact that we use more comprehensive data, exploit additional policy variation from changes in the tax code in the 1990's, and that benefits during our time period are not always an increasing function of income. In addition, our income and tax benefit values are estimated, which introduces measurement error that biases our point estimate towards zero.

Table 4 shows estimates stratified by demographic group. When stratifying by demographic group, the analysis is based on much fewer cells, which causes us to lose much of our statistical power. Although some of the results are still statistically significant, others are not, partially due to lack of power. However, looking at the effects by demographic group provides insight into whether specific groups are changing their behavior more than others. The estimates shown in the table are for the effect of an additional $1,000 in tax benefits. The first two rows show the results by marital status. For married women, tax benefits have a positive and significant effect on the percent difference between December and January births. These appear to be driven by shifting c-sections and inductions from January to December. Stratifying by educational attainment, women with a high school degree or less are also more likely to have December births when the benefit of doing so is higher. There appear to be differences by race as well. White mothers are more likely to respond to the tax benefits, also by shifting their c-sections and inductions to December. Estimates stratified by parity are largely statistically insignificant (yet consistent with our main estimates). There are two reasons this is not surprising: first, much of the variation we exploit comes from differences in benefits across birth order, and stratifying by parity removes this important variation. Second, since relatively few families have three or more children, sample size is limited for those groups.

5.2 Infant Health Outcomes

Next, we investigate how the manipulation of birth timing affects infant health, focusing on infant birthweight and five minute Apgar score.

To do this, we compare how infant health measures in the affected months compare to the comparison months. We estimate the effect of tax benefits on mean birthweight, median birthweight, and the percentage of babies in the cell that are classified as low birthweight (less than 2500 grams). In addition, we look at the mean and median Apgar score and the percentage of babies whose score is in the normal range of 7 to 10. Equation 6 shows how the mean birthweight variable is calculated; all other variables are constructed using the same calculation.

$$\text{Mean BW}_c \quad = \quad \frac{\text{Mean BW Dec \& Jan}_c - \text{Mean BW Comparison Months}_c}{\text{Mean BW Comparison Months}_c} \times 100 \qquad (6)$$

We use this approach, rather than comparing December to January, in order to avoid the issue of selection in the decision to manipulate a birth. For example, it is likely that only low-risk births are shifted earlier, in which case the estimated impact would be biased downward.[20] By averaging all babies born in the affected months together, we are able to eliminate this source of bias.

Table 5 shows the results using the average of all births in the cell. While the coefficients of interest are not statistically significant for the measures of birthweight, they all have the expected sign: higher tax benefits translate into lower mean and median birthweight, as well as a higher percentage of low birthweight babies. The coefficients of interest for the measures of Apgar scores are statistically significant, but are so small that they are not economically significant.

Since we know that most of the shifting is driven by c-sections, we estimate the health effects using cell averages calculated from c-sections only. Estimates are shown in Table 6 and give us better insight into the health consequences of birth timing manipulation. There are small decreases in both mean birthweight and mean Apgar score, while the coefficients for median birthweight and Apgar score are very close to zero. Column three shows that an additional $1,000 in tax benefits leads to a 3.8 percentage point increase in percent low birthweight. On average, approximately 70 babies per 1,000 babies born by c-section are classified as low birthweight. An increase of 3.8

[20]Imagine two babies who are due on January 5. Baby A would weigh 3500 grams if born on January 5, while baby B would be 2500 grams. The doctors know that baby B is very small, so they hold off as long as possible, and she is delivered on January 5, weighing 2500 grams. The c-section to deliver Baby A is scheduled for December 31 and she born at 3300 grams. If we compare the shifted baby to the non-shifted one, we would think that the shifting made the baby bigger. In reality, Baby A is 200 grams smaller because of the earlier delivery.

percentage points in our dependent variable translates into approximately 2.5 additional babies, per one thousand c-sections, that are born at a low birthweight. There is also a very small decrease in the average percentage of babies with scores in the normal Apgar range.

6 Robustness Checks

To verify that the difference in births between December and January is not just spuriously correlated with tax benefits, we estimate equation 1 for every month pair. For example, we look at whether the percent differences between February and March are correlated with the tax benefit that was calculated for the December/January comparison.[21] Figure 3 plots the estimated tax benefit coefficient for each pair of months, focusing on the between month shift in the percent difference in births. Figure 4 shows the effect of the tax benefit on the percent difference in c-sections. Although there is a statistically significant relationship between tax benefits on total births in some of the other month pairs, the coefficient for December/January (the plotted point furthest to the right) is the largest in magnitude. More importantly, we know that most of the manipulation comes from changes in the timing of c-sections. Figure 4 shows that the only other month pair that is even marginally significant is July/August. The December/January comparison is the only one that is significant at the 5% level, and the coefficient is more than twice the magnitude of the other month pairs.

One shortcoming of the Vital Statistics data is that in some states parents' marital status is not recorded on the birth certificate. Instead, marital status is inferred using the surnames of the child, mother, and father as well as whether or not a father is listed. Marital status is an important part of our analysis, thus, we want to be sure our measure of it is as accurate as possible. The tax benefit received for a child relies greatly upon the marital status of the parents (i.e., whether the taxpayer

[21]We do not include January/February or November/December, as these comparisons would be contaminated by the shifting into (out of) December (January).

is filing jointly or as head of household). Marital status is also one of the demographic variables we use to define our cells. In order to be certain that inference of marital status is not affecting our results, we exclude the six states that infer marital status at any time during our sample period.[22] The results of this exercise are included in Tables 7 - 9, and do not differ qualitatively from our main results.

7 Conclusion

Scheduling c-sections and inductions for convenience has become an increasingly common practice in the United States and around the world. The consequences of these actions were previously unknown, however. The U.S. income tax system is structured in such a way that it gives women who are due to deliver in the beginning of January a financial incentive to give birth in December instead. This gives us a unique natural experiment with which to estimate how elective birth timing changes affect the wellbeing of newborns.

We verify that expectant mothers are in fact manipulating the timing of their births in order to gain additional tax benefits, and that this increase in December births is mostly driven by women who shift their January c-sections to December. Roughly 25 per 1000 January c-sections are moved to December for every $1,000 in additional tax benefits. We also find suggestive evidence of some switching of January vaginal births to December c-sections, although these estimates are not statistically significant. These results support previous findings that parents respond to financial incentives when planning the birth of their child.

Our results indicate that this type of medical intervention has consequences for infant health: tax benefit induced c-sections are associated with a higher probability that the infant will be low birthweight. Apgar scores also appear to be negatively affected by changes in the timing of c-

[22]The six states that infer marital status are California, Connecticut, Michigan, Nevada, New York, and Texas

sections, though that effect is very small. Studies find that birthweight has a causal effect on various short- and long- term outcomes. Relative to their counterparts, low birthweight infants tend have lower IQ, lower educational attainment, poorer self-reported health status, lower earnings as adults, and lower birthweight children (**?**Currie & Hyson 1999, Black et al. 2007). Black et al. (2007), for example, find that a 7.5 percent decrease in birthweight leads to a 0.5 stanine decrease in IQ, a one percent decease in full-time earnings, and a 1.1 percent decrease in the birthweight of their children. This suggests that small changes in the timing of birth may have significant, and potentially costly, long-term consequences.

Over time, both patients and doctors have experienced increasing discretion with respect to when a baby is born. Our results suggest that even small reductions in gestation length can have negative, long-term effects on the newborn, the cost of timing births for convenience or financial gain may be far greater than the benefit. Since the consequences of birth timing manipulation were previously unknown, doctors and parents felt comfortable making adjustments to the delivery date, especially when their were personal gains to doing so. Our findings shed light on the fact that these changes are not without consequence, and there should be increased scrutiny within the medical community regarding elective births prior the baby's natural arrival.

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8 Figures

Figure 1: Child Tax Benefits - Married Parents

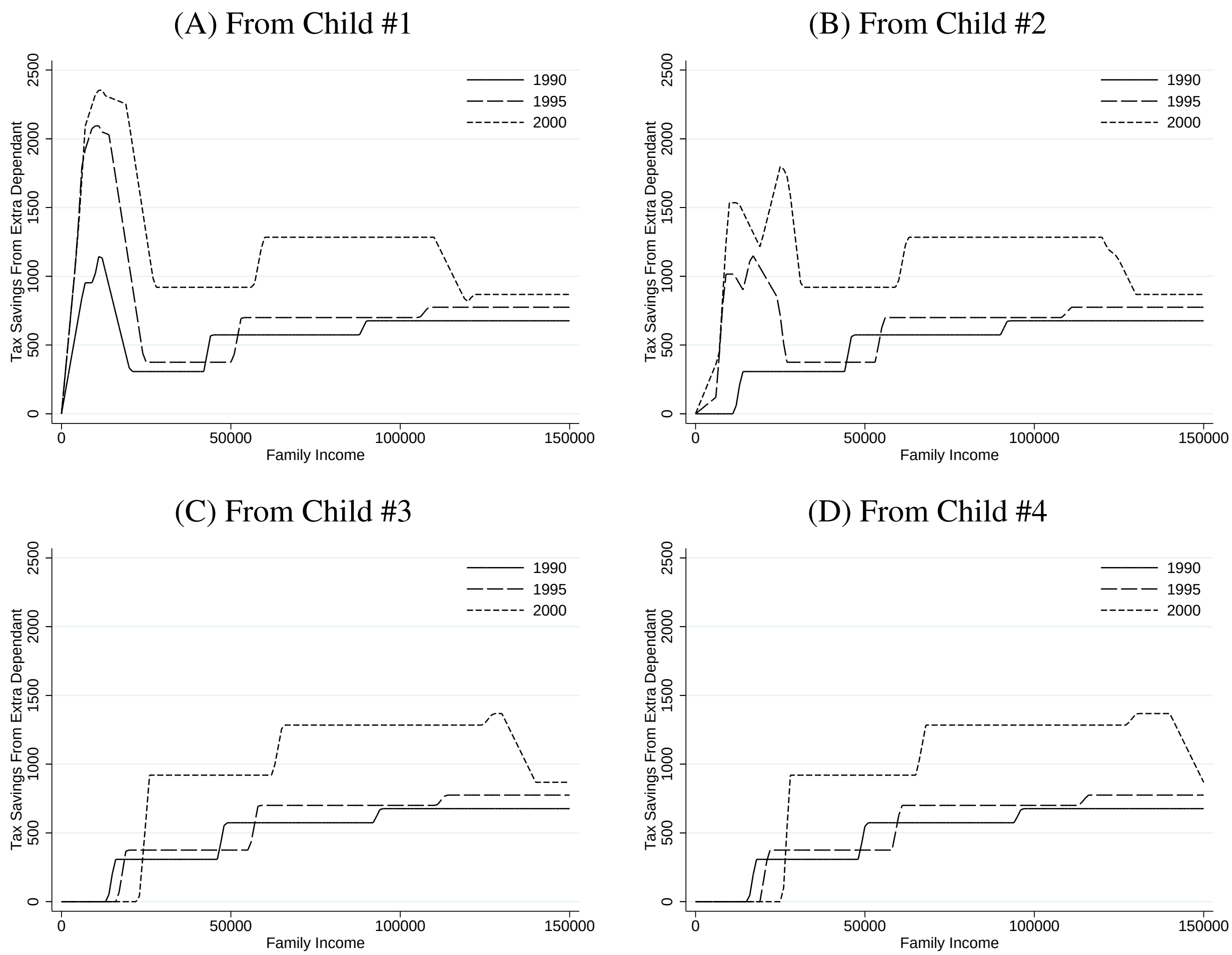


Figure 2: Child Tax Benefits - Single Mother

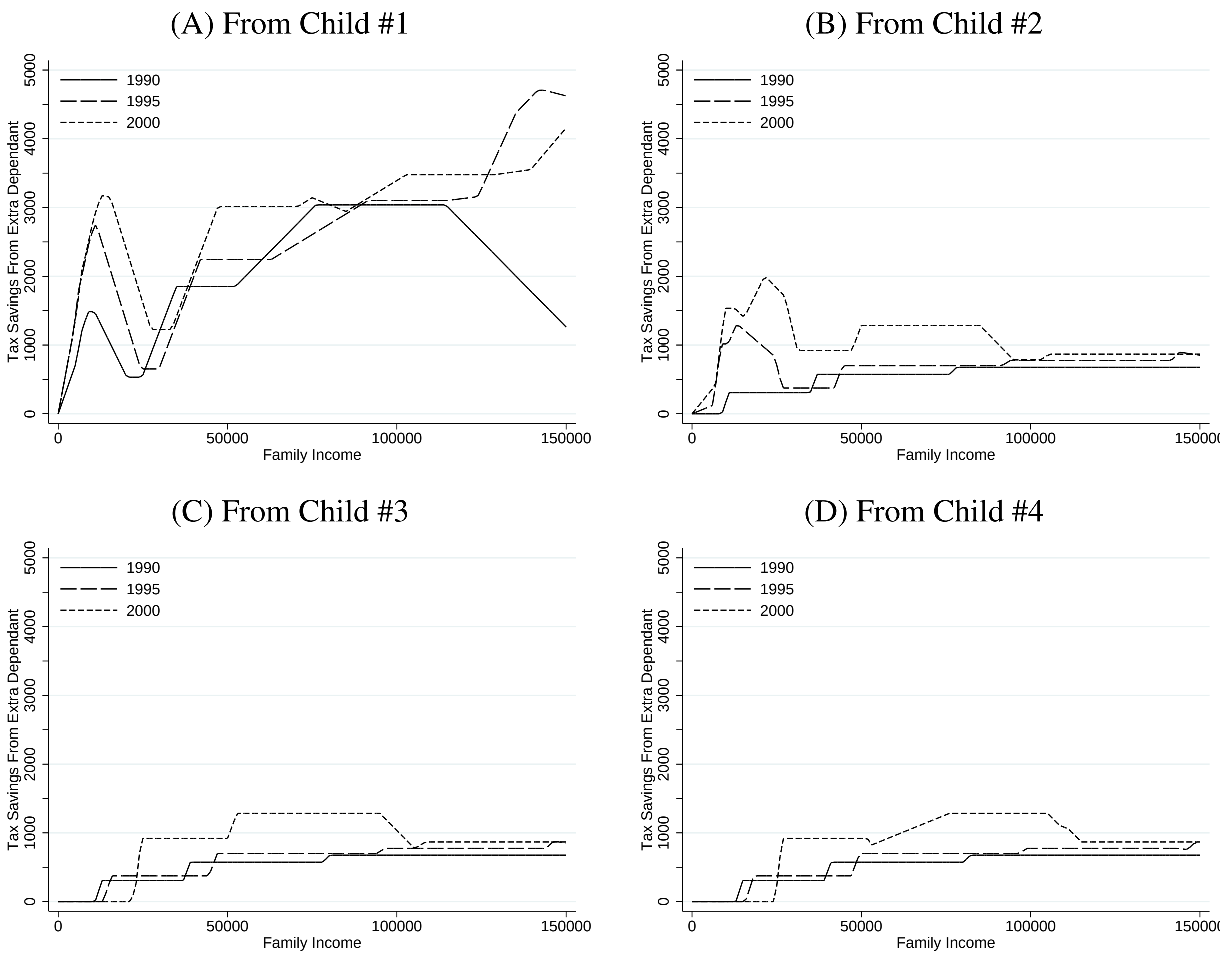


Figure 3: Falsification Test: Difference in Births Across all Months

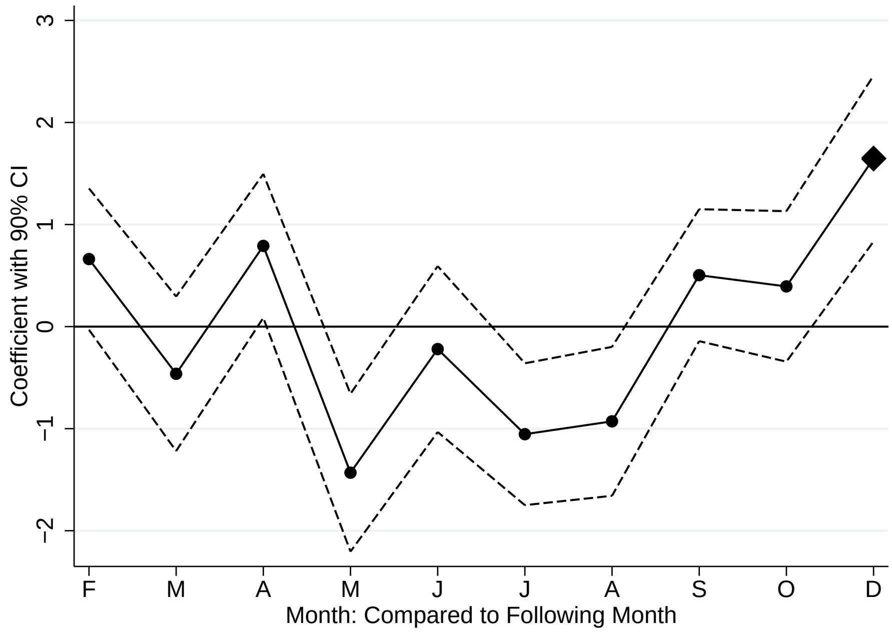
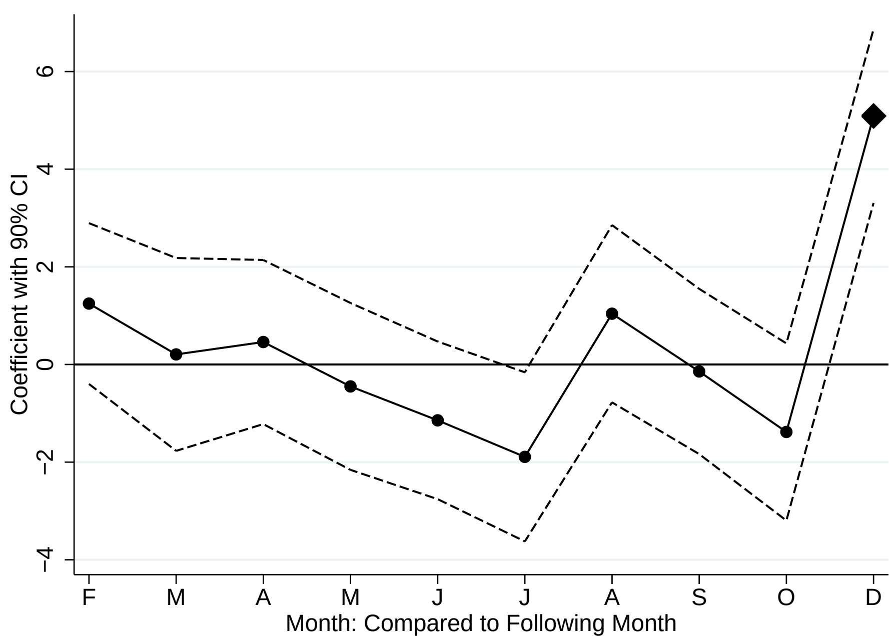


Figure 4: Falsification Test: Difference in C-Sections Across all Months



9 Tables

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Family Income ($000)	44389	44.39	22.90	0	203.1
Tax Saving ($000)	44389	0.65	0.42	-0.09	3.5
Percent Saving	44387	2.82	3.71	-0.93	88.6
Total Births D+J	44443	540.12	663.82	11	4405
C-section share	44443	0.24	0.08	0	1
Induction share	44443	0.16	0.08	0	0.78

Notes: Means are weighted by the number of births in Dec. + Jan

Table 2: Summary Statistics - Comparison of December and January

Variable	December	January	Difference	SE
C-sections	62.77	60.17	-2.60***	0.51
Inductions	40.33	38.47	-1.86***	0.30
Mean Birthweight (grams)	3350.4	3361.4	11.0***	0.75
Median Birthweight (grams)	3382.2	3393.6	11.4***	0.71
% Low Birthweight (<2500g)	6.65	6.44	-0.21***	0.02
Mean 5 Min Apgar Score	8.95	8.95	0.00	0.00
Median 5 Min Apgar Score	9.00	9.00	0.00	0.00
% Normal Apgar Score (>6)	99.05	99.05	0.00	0.00
Gestation (weeks)	39.0	38.98	-0.02***	0.00

Notes: Means are weighted by the number of births in Dec. + Jan

* (p<0.10), ** (p<0.05), *** (p<0.01)

Table 3: Results: Shifting and Switching

	Total	C-Section		Induction	
	Diff	Diff	Share	Diff	Share
TaxBen (000s)	1.647***	5.090***	0.377	2.093	0.0163
	(0.635)	(1.391)	(0.473)	(1.758)	(0.643)
Income × First Child	0.0509	0.0968	-0.00120	-0.0341	-0.00973
	(0.0310)	(0.0737)	(0.0254)	(0.0895)	(0.0361)
Income × Second Child	0.0323	0.0794	0.00365	-0.0483	-0.0170
	(0.0321)	(0.0740)	(0.0269)	(0.0941)	(0.0346)
Income × Third Child	0.0507	0.0625	0.00494	-0.0822	-0.00548
	(0.0339)	(0.0753)	(0.0260)	(0.0993)	(0.0366)
Income × Fourth Child	0.0396	0.0307	-0.0127	0.0252	0.00968
	(0.0341)	(0.0755)	(0.0284)	(0.0939)	(0.0366)
Second Child	0.909	4.835***	0.706	1.255	0.195
	(0.695)	(1.772)	(0.618)	(2.272)	(0.819)
Third Child	1.374	8.628***	0.706	5.169*	-1.111
	(0.876)	(2.319)	(0.819)	(2.971)	(1.050)
Fourth Child	3.003***	13.77***	1.187	3.303	-0.192
	(1.052)	(2.726)	(0.954)	(3.329)	(1.420)
Constant	-7.469	-1279.3	574.4	-2260.0**	-871.5
	(527.2)	(1137.2)	(625.3)	(1107.3)	(707.3)
Mean	4.539	12.095	0.716	12.718	-0.424
N	44389	42006	44389	38592	44387

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year and demographic group fixed effects, as well as demographic group × linear time trend controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Results by Demographic Group

	Total	C-Section		Induction	
Group	Diff	Diff	Share	Diff	Share
Married	4.522**	9.482**	0.449	8.527*	0.517
	(1.828)	(4.535)	(1.555)	(4.971)	(2.193)
Not Married	-0.611	2.436	-0.462	-4.640	-0.114
	(1.133)	(3.028)	(1.000)	(4.648)	(1.605)
White	1.564**	4.737***	0.0898	3.204*	-0.252
	(0.711)	(1.571)	(0.519)	(1.746)	(0.700)
Black	-0.696	3.344	1.058	-6.505	1.293
	(1.594)	(3.654)	(1.083)	(5.894)	(1.766)
First Child	4.957	7.858	0.218	5.793	3.858
	(3.506)	(5.873)	(2.041)	(7.189)	(2.504)
Second Child	2.010	3.029	-0.758	9.449	5.622*
	(3.064)	(7.283)	(2.340)	(8.615)	(3.218)
Third Child	1.908	3.232	0.788	-9.528	0.172
	(3.437)	(8.689)	(3.217)	(13.64)	(4.262)
Fourth Child	1.459	22.25	7.194	20.69	-8.758
	(5.672)	(14.85)	(4.838)	(18.33)	(6.121)
HS or less	1.178	6.083***	0.145	2.428	0.472
	(0.718)	(1.589)	(0.558)	(1.956)	(0.724)
more than HS	0.173	1.284	-0.327	5.338	0.810
	(2.327)	(4.984)	(1.463)	(5.250)	(2.348)

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year, parity and demographic group fixed effects, as well as demographic group × linear time trend and parity × income controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Infant Health Outcomes: All Births

	Birthweight			APGAR		
	Mean	Median	%Low (< 2500g)	Mean	Median	%Normal (≥ 7)
TaxBen (000s)	-0.0339	-0.00104	1.644	-0.0574**	0.0135*	-0.0555*
	(0.0502)	(0.0509)	(1.078)	(0.0289)	(0.00727)	(0.0290)
Income × First Child	0.00122	-0.000343	-0.0366	0.000440	-0.0000183	0.00247**
	(0.00243)	(0.00222)	(0.0537)	(0.00114)	(0.000656)	(0.00122)
Income × Second Child	-0.000327	-0.00209	-0.00816	0.00130	0.000584	0.00397***
	(0.00247)	(0.00224)	(0.0569)	(0.00123)	(0.000759)	(0.00127)
Income × Third Child	0.00129	-0.00166	-0.0592	0.00187	-0.000105	0.00426***
	(0.00265)	(0.00242)	(0.0588)	(0.00125)	(0.000710)	(0.00134)
Income × Fourth Child	0.00115	-0.00144	-0.0642	0.00233*	0.000134	0.00431***
	(0.00275)	(0.00245)	(0.0610)	(0.00133)	(0.000748)	(0.00138)
Second Child	-0.0826	-0.0347	2.267	-0.0682**	-0.0298	-0.0785**
	(0.0551)	(0.0554)	(1.432)	(0.0322)	(0.0242)	(0.0340)
Third Child	-0.117	-0.0417	3.470*	-0.0982**	0.00944	-0.0962**
	(0.0715)	(0.0772)	(1.811)	(0.0418)	(0.0257)	(0.0447)
Fourth Child	-0.00785	0.00671	3.389*	-0.0809*	-0.00445	-0.0459
	(0.0838)	(0.0886)	(2.016)	(0.0482)	(0.0288)	(0.0510)
Constant	-12.20	8.335	690.9	-30.41*	2.772	-22.40*
	(24.63)	(24.90)	(717.7)	(17.85)	(9.754)	(13.23)
Mean	-0.317	-0.328	5.803	0.002	0.003	0.000
N	44389	44389	44380	40804	40804	44389

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year and demographic group fixed effects, as well as demographic group × linear time trend controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Infant Health Outcomes: C-Sections Only

	Birthweight			APGAR		
	Mean	Median	%Low ($<$ 2500g)	Mean	Median	%Normal ($\geq$ 7)
TaxBen (000s)	-0.219*	0.00612	3.821**	-0.201***	0.0373	-0.164*
	(0.124)	(0.120)	(1.918)	(0.0728)	(0.0227)	(0.0878)
Income × First Child	0.00825	0.00754	0.0227	-0.00277	-0.00483***	-0.000500
	(0.00607)	(0.00558)	(0.0924)	(0.00265)	(0.00135)	(0.00348)
Income × Second Child	0.00562	0.00219	0.0313	0.000616	-0.00633***	0.00259
	(0.00607)	(0.00547)	(0.0967)	(0.00279)	(0.00139)	(0.00356)
Income × Third Child	0.0100	0.00739	-0.00532	0.00139	-0.00582***	0.00364
	(0.00633)	(0.00600)	(0.0982)	(0.00290)	(0.00136)	(0.00366)
Income × Fourth Child	0.00848	0.00466	0.0134	0.00240	-0.00215	0.00407
	(0.00667)	(0.00625)	(0.0994)	(0.00301)	(0.00131)	(0.00384)
Second Child	-0.0805	0.174	2.637	-0.216***	0.0711***	-0.153
	(0.140)	(0.146)	(2.275)	(0.0756)	(0.0250)	(0.0969)
Third Child	-0.302*	-0.112	4.110	-0.313***	0.0136	-0.271**
	(0.183)	(0.196)	(2.760)	(0.105)	(0.0398)	(0.128)
Fourth Child	-0.0761	-0.0906	4.818	-0.269**	-0.251***	-0.170
	(0.217)	(0.226)	(3.137)	(0.122)	(0.0592)	(0.148)
Constant	11.26	44.58	-385.8	-58.34	-8.637	-46.21
	(84.57)	(69.86)	(1378.7)	(48.00)	(15.96)	(45.78)
Mean	-0.290	-0.375	6.452	-0.009	-0.021	0.004
N	44075	44075	43843	40498	40498	44079

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year and demographic group fixed effects, as well as demographic group × linear time trend controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Robustness Check: Main Results Excluding States that Infer Marital Status

	Total	C-Section		Induction	
	Diff	Diff	Share	Diff	Share
TaxBen (000s)	1.232*	6.596***	0.0349	2.626	0.192
	(0.692)	(1.848)	(0.682)	(2.167)	(0.795)
Income × First Child	0.0381	0.00374	-0.0163	-0.00333	0.0371
	(0.0349)	(0.0942)	(0.0346)	(0.110)	(0.0454)
Income × Second Child	0.0167	-0.0349	-0.0126	-0.0219	0.0218
	(0.0358)	(0.0933)	(0.0361)	(0.120)	(0.0458)
Income × Third Child	0.0376	-0.0719	-0.00221	-0.0295	0.0366
	(0.0367)	(0.0948)	(0.0352)	(0.119)	(0.0459)
Income × Fourth Child	0.0317	-0.0379	-0.0311	0.0600	0.0175
	(0.0366)	(0.0981)	(0.0353)	(0.126)	(0.0471)
Second Child	0.554	5.906**	0.776	2.143	0.782
	(0.914)	(2.409)	(0.759)	(2.925)	(0.921)
Third Child	1.311	11.91***	0.272	5.224	-0.443
	(1.118)	(3.127)	(1.065)	(3.802)	(1.245)
Fourth Child	2.634**	14.48***	1.218	4.197	1.900
	(1.311)	(3.798)	(1.216)	(4.254)	(1.655)
Constant	-141.5	-2111.5	407.6	-3244.9**	-1128.2*
	(484.3)	(1615.9)	(490.7)	(1365.0)	(582.5)
Mean	5.275	14.775	0.892	15.179	0.256
N	36082	33997	36082	31329	36082

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year and demographic group fixed effects, as well as demographic group × linear time trend controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Robustness Check: All Health Results Excluding States that Infer Marital Status

	Birthweight			APGAR		
	Mean	Median	%Low (< 2500g)	Mean	Median	%Normal (≥ 7)
TaxBen (000s)	-0.0161	0.0107	1.676	-0.0585*	0.0170**	-0.0945**
	(0.0642)	(0.0642)	(1.404)	(0.0335)	(0.00833)	(0.0452)
Income × First Child	-0.00199	-0.000960	-0.0373	0.000220	0.0000899	0.000161
	(0.00296)	(0.00280)	(0.0761)	(0.00128)	(0.000757)	(0.00176)
Income × Second Child	-0.00488	-0.00401	0.0150	0.00142	0.000834	0.00294
	(0.00300)	(0.00280)	(0.0787)	(0.00138)	(0.000908)	(0.00180)
Income × Third Child	-0.00237	-0.00292	-0.0468	0.00197	0.0000170	0.00337*
	(0.00301)	(0.00281)	(0.0774)	(0.00139)	(0.000840)	(0.00188)
Income × Fourth Child	-0.00330	-0.00326	-0.0393	0.00236*	0.000242	0.00325*
	(0.00316)	(0.00305)	(0.0791)	(0.00143)	(0.000884)	(0.00190)
Second Child	-0.0541	0.000364	1.209	-0.0827**	-0.0358	-0.154***
	(0.0727)	(0.0775)	(1.730)	(0.0350)	(0.0280)	(0.0504)
Third Child	-0.146	-0.0314	3.283	-0.118**	0.00956	-0.184***
	(0.0967)	(0.101)	(2.291)	(0.0470)	(0.0292)	(0.0667)
Fourth Child	-0.0130	0.0404	3.223	-0.0921*	-0.00511	-0.116
	(0.111)	(0.116)	(2.520)	(0.0541)	(0.0327)	(0.0745)
Constant	14.11	58.76	961.4	-29.54	3.538	-42.05*
	(36.11)	(36.07)	(925.3)	(19.75)	(11.20)	(22.68)
Mean	-0.320	-0.333	6.502	0.009	0.003	0.008
N	36082	36082	36073	36082	36082	36082

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year and demographic group fixed effects, as well as demographic group × linear time trend controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Robustness Check: C-Section Health Results Excluding States that Infer Marital Status

	Birthweight			APGAR		
	Mean	Median	%Low (< 2500g)	Mean	Median	%Normal (≥ 7)
TaxBen (000s)	-0.239	-0.0146	5.410**	-0.170**	0.0399	-0.200
	(0.179)	(0.173)	(2.360)	(0.0790)	(0.0273)	(0.130)
Income × First Child	0.00728	0.0109	-0.0748	-0.00240	-0.00482***	-0.00469
	(0.00809)	(0.00756)	(0.130)	(0.00318)	(0.00166)	(0.00513)
Income × Second Child	0.00232	0.00316	-0.0489	0.00101	-0.00647***	0.000237
	(0.00827)	(0.00794)	(0.134)	(0.00331)	(0.00170)	(0.00522)
Income × Third Child	0.00805	0.00935	-0.103	0.00139	-0.00601***	0.00133
	(0.00816)	(0.00803)	(0.129)	(0.00335)	(0.00163)	(0.00543)
Income × Fourth Child	0.00661	0.00644	-0.0544	0.00227	-0.00194	0.00208
	(0.00864)	(0.00840)	(0.126)	(0.00349)	(0.00160)	(0.00548)
Second Child	-0.0403	0.228	1.697	-0.196**	0.0777***	-0.239
	(0.187)	(0.189)	(2.767)	(0.0858)	(0.0287)	(0.147)
Third Child	-0.321	-0.0410	4.107	-0.283**	0.0177	-0.383**
	(0.239)	(0.253)	(3.524)	(0.115)	(0.0465)	(0.184)
Fourth Child	-0.164	-0.143	5.139	-0.218	-0.270***	-0.263
	(0.301)	(0.306)	(4.042)	(0.138)	(0.0700)	(0.222)
Constant	-13.85	130.3	2522.9	-54.77	-12.58	-72.24
	(110.5)	(100.6)	(1865.5)	(52.10)	(18.07)	(83.26)
Mean	-0.317	-0.429	7.849	-0.006	-0.023	0.009
N	35796	35796	35584	35798	35798	35799

Notes: Standard errors are reported in parentheses and clustered by state-year. All regressions include state, year and demographic group fixed effects, as well as demographic group × linear time trend controls. Regressions are weighted by the number of births in Dec. + Jan. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A Appendix

For example, imagine the following scenario for December 1995 and January 1996 and its 20 comparison months: Feb-Nov 1995 and Feb-Nov 1996. Suppose that without any tax benefit, there are 100 births per month of which 25 are c-sections:

$$\%\text{C-Sec D \& J}_c = \frac{25+25}{100+100} \times 100 = 25\% \text{ and } \%\text{C-Sec Comp. Months}_c = \frac{25*20}{100*20} \times 100 = 25\%$$
$$\text{C-Sec Share}_c = \frac{25-25}{25} \times 100 = 0\%$$

If the introduction of tax benefits causes two c-sections to *shift* from January to December:

$$\%\text{C-Sec D \& J}_c = \frac{\mathbf{27+23}}{100+100} \times 100 = 25\% \text{ and } \%\text{C-Sec Comp. Months}_c = \frac{25*20}{100*20} \times 100 = 25\%$$
$$\text{C-Sec Share}_c = \frac{25-25}{25} \times 100 = 0\%$$

C-Sec Share$_c$ is unaffected by the shift. However, if two vaginal births *shift* earlier AND *switch* to c-sections:

$$\%\text{C-Sec D \& J}_c = \frac{\mathbf{27+25}}{100+100} \times 100 = \mathbf{26\%} \text{ and } \%\text{C-Sec Comp. Months}_c = \frac{25*20}{100*20} \times 100 = 25\%$$
$$\text{C-Sec Share}_c = \frac{\mathbf{26}-25}{25} \times 100 = \mathbf{4\%}$$

The *switch* from vaginal births to c-sections has caused the percent of total births that are c-sections to increase during the affected months, while it remains unchanged during the comparison months. This causes C-Sec Share to increase.