# Taxes and the Timing of Births

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Because the tax savings of having a child are realized only if the birth takes place before midnight, January 1, the incentives for the "marginal" birth are substantial. Using a sample of children from the National Longitudinal Survey of Youth, we find that the probability that a child is born in the last week of December, rather than the first week of January, is positively correlated with tax benefits. We estimate that increasing the tax benefit of having a child by $500 raises the probability of having the child in the last week of December by 26.9 percent.

Economists have paid considerable attention to the relationship between taxes and the timing of behavior.[1] There is evidence, for example, that taxes do not materially affect the magnitude of capital gains

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[1] Taxes have been shown to be correlated with the timing of events including marriage (Gelardi 1996; Alm and Whittington 1997), capital gains realization (Auten, Burman, and Randolph 1989; Burman and Randolph 1994), and charitable contributions (Randolph 1995).

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realizations or charitable contributions, but have a sizable effect on the timing of these actions. Despite the importance of fertility to economic welfare, the relationship between taxes and the timing of births has not received comparable attention. Because the annual tax savings associated with a birth are realized if the birth takes place any time *before* midnight January 1, parents who are expecting a child around the end of the year have an incentive to time the birth at the end of December rather than at the beginning of January. This paper is the first to support the anecdotal evidence of a behavioral response to these incentives with empirical estimates of its magnitude.[2] Using a sample of children from the National Longitudinal Survey of Youth (NLSY) born in the last week of December and the first week of January, for the years 1979–93, we find that the probability that the child is born in the last week of December rather than the first week of January is positively correlated with tax benefits. We estimate that the proposed child tax credit in the Tax Relief Act of 1997 increases the probability of having the child in the last week of December rather than the first week of January by 26.9 percent.

This paper proceeds as follows: Section I describes provisions of the U.S. personal income tax code that may affect the timing of births. In Section II we provide evidence from the U.S. natality data that the timing of births can be manipulated over a short time period. Section III documents the spike in late-December births relative to the early-January births and explores this relationship further through the use of microdata from the NLSY. We discuss the magnitude of our findings in the context of the 1997 Tax Relief Act. In Section IV, we consider the nontax costs that may accompany this behavior. Section V presents conclusions.

## I. Tax Treatment of Births

The U.S. federal personal income tax defines the tax unit as the family and subsidizes the cost of having a child along three dimen-

[2] "The doctor was trying to get him out so he could be the first baby of 1990, but my husband was more concerned about getting him out in 1989 to use as a tax write-off," said Annie White, who delivered the last baby of the 1980s in Gwinnett County, Ga., and obtained a $2,000 tax deduction. A nurse present at that hospital reports that "generally, people who deliver between Christmas and New Year's are trying to get the tax deduction and get delivered before the first of the year" (Morian 1990, p. 1). Similar stories documenting the tax benefits from a late-December birth are found in the *St. Petersburg Times* (Levesque 1997), the *Denver Post* (O'Driscoll 1996), the *Pantagraph* ("Baby Born on Christmas," 1997), and the *Richmond Times-Dispatch* (Whitley 1997). Furthermore, physicians and mothers that we interviewed confirmed our hypothesis, including one mother whose doctor encouraged her to schedule her late-December birth far in advance to avoid the rush of mothers hoping to have their babies before the end of the tax year.

sions: the personal exemption, the earned income tax credit (EITC), and the standard deduction. A tax unit may deduct the value of the personal exemption from taxable income for each person claimed as a dependent (defined as someone who lives with a taxpayer or for whom one provides more than half his or her support during the year [Internal Revenue Service 1996]). Therefore, the birth of a child any time during the year lowers tax liability by the value of the personal exemption times the unit's marginal tax rate. In addition, units with children and sufficiently low earnings qualify for the EITC. Unlike other credits, the EITC is refundable; that is, if a filing unit's credit is greater than its tax liability, the Treasury refunds the difference. Since 1991, the EITC benefit levels and income limits increase with a second child but do not vary for children beyond the second. A birth, therefore, may result in either eligibility for the EITC or an increase in the value of the credit. The current benefit levels are quite generous, with a maximum of $2,152 for a family with one child and $3,556 for a family with two or more children in 1996. Finally, the Tax Reform Act of 1986 introduced a distinct standard deduction for filers who are heads of households that exceeds that of single filers. A single person who has her first child may experience a reduction in tax liability by filing as a head of household rather than as a single filer. In addition, the income brackets are wider for head of household filers, and the birth of a first child may reduce tax liability by decreasing the top marginal tax rate. All these aspects of the tax code have varied substantially over time, and their magnitudes are illustrated in table 1. We use this exogenous source of variation in tax liability as an identification strategy in our econometric model.

The size of these incentives can be quite large. For example, a single woman with $10,000 in adjusted gross income (AGI) in 1996 reduces her tax burden by $2,670 with the birth of her first child. The birth allows the woman to file as a head of household, thus receiving a higher standard deduction and an additional personal exemption than she was eligible for as a single filer. In addition, this tax unit becomes eligible for a $2,152 EITC. The marginal tax benefit for a second child is $1,404 and arises from the increase in the EITC. The marginal tax benefit of a child to a married couple in 1996 with $50,000 in AGI is $382.50, which is the additional personal exemption of $2,550 times the couple's 15 percent marginal tax rate.

## II. Can Births Be Timed?

The tax system increases the benefits of a late-December birth relative to an early-January birth, and economic theory suggests that

TABLE 1

U.S. Tax Parameters, 1979–96

| Year | Personal Exemption (Nominal Dollars) | Personal Exemption (1996 Dollars) | Maximum Marginal Tax Rate (%) | Maximum EITC (Nominal Dollars) | EITC Income Maximum (Nominal Dollars) | Maximum EITC (1996 Dollars) | EITC Income Maximum (1996 Dollars) |
|---|---|---|---|---|---|---|---|
| 1979 | $1,000 | $1,986 | 70.0 | $500 | $10,000 | $993 | $19,861 |
| 1980 | 1,000 | 1,817 | 70.0 | 500 | 10,000 | 909 | 18,182 |
| 1981 | 1,000 | 1,662 | 70.0 | 500 | 10,000 | 831 | 16,617 |
| 1982 | 1,000 | 1,563 | 50.0 | 500 | 10,000 | 782 | 15,632 |
| 1983 | 1,000 | 1,499 | 50.0 | 500 | 10,000 | 750 | 14,993 |
| 1984 | 1,000 | 1,445 | 50.0 | 500 | 10,000 | 750 | 14,448 |
| 1985 | 1,040 | 1,453 | 50.0 | 550 | 11,000 | 768 | 15,365 |
| 1986 | 1,080 | 1,470 | 38.5 | 550 | 11,000 | 749 | 14,974 |
| 1987 | 1,900 | 2,509 | 33.0 | 851 | 15,432 | 1,125 | 20,380 |
| 1988 | 1,950 | 2,485 | 33.0 | 874 | 18,576 | 1,114 | 23,668 |
| 1989 | 2,000 | 2,445 | 33.0 | 910 | 19,340 | 1,113 | 23,645 |
| 1990 | 2,050 | 2,402 | 31.0 | 953 | 20,264 | 1,117 | 23,747 |
| 1991 | 2,150 | 2,423 | 31.0 | 1,192 | 21,250 | 1,344 | 23,951 |
| | | | | 1,235* | 21,250* | 1,392* | 23,951* |
| 1992 | 2,300 | 2,523 | 31.0 | 1,324 | 22,370 | 1,452 | 24,538 |
| | | | | 1,384* | 22,370* | 1,518* | 24,538* |
| 1993 | 2,350 | 2,512 | 39.6 | 1,434 | 23,050 | 1,533 | 24,640 |
| | | | | 1,511* | 23,050* | 1,615* | 24,640* |
| 1994 | 2,450 | 2,561 | 39.6 | 2,038 | 23,755 | 2,130 | 24,828 |
| | | | | 2,528* | 25,296* | 2,642* | 26,439* |
| 1995 | 2,500 | 2,549 | 39.6 | 2,094 | 24,396 | 2,135 | 24,872 |
| | | | | 3,110* | 26,673* | 3,171* | 27,194* |
| 1996 | 2,550 | 2,550 | 39.6 | 2,152 | 25,078 | 2,152 | 25,078 |
| | | | | 3,556* | 28,495* | 3,556* | 28,496* |

Source.—Various Form 1040 U.S. individual tax returns.

Note.—From 1994 onward, tax units without children also became eligible for the EITC. The maximum EITC for such households in nominal dollars was $306, $314, and $323 in 1994, 1995, and 1996, respectively. In these years, EITC income maximum in nominal dollars for such households was $9,000, $9,230, and $9,500.

* Value for a second child.

people will respond to these incentives provided that birth is a choice variable. However, in contrast to models of taxes and the timing of charitable contributions, capital gains, or marriage, biology plays a large role in the exact timing of a birth. Planning perfectly a child's date of birth without medical intervention is unlikely. Once conception occurs, the due date is estimated at 280 days from the start of the woman's last menstrual period. The *American Medical Women's Association's Guide to Pregnancy and Childbirth* (Epps and Stewart 1996, p. 97) cautions that "this is only a guide," and the time to birth will vary considerably, usually between 36 and 42 weeks (Ventura et al. 1996). Because naturally planning the exact date of birth is not feasible, another mechanism is needed.

The two primary means of medically manipulating the exact date of birth are cesarean section deliveries and inducement of labor. Cesarean births require invasive surgery and involve making an incision in the mother's abdomen. Cesareans are sometimes scheduled in advance when existing conditions of the mother or baby prevent a vaginal delivery and are also performed under emergency situations if labor is not proceeding normally. The inducement of labor consists of stimulation of uterine contractions before the spontaneous onset of labor for the purpose of accomplishing delivery. Like cesarean deliveries, the reasons for inducement are varied, and it may be scheduled in advance or performed under emergency conditions.

Figure 1 and table 2, based on 1993 U.S. natality records, show clearly that births are not uniformly distributed over a given week and suggest strongly that the timing of births is being manipulated.[3] The number of weekend births, especially cesareans and inducements, is substantially below the number of weekday births. The number of births occurring on Sunday and Saturday are 22 and 17 percent below the daily average. Births during which labor is induced are 56 and 31 percent less likely to occur on Sundays and Saturdays, relative to the daily average.

## III. Empirical Results on Taxes and the Timing of Births

If marginal tax benefits exert a strong influence on the timing of births, we do not expect births to be uniformly distributed over the two-week period surrounding the end of the year. Rather, we expect

[3] These data are taken from standardized birth certificates for each live birth occurring in the 50 states and the District of Columbia, representing over 99 percent of all births.

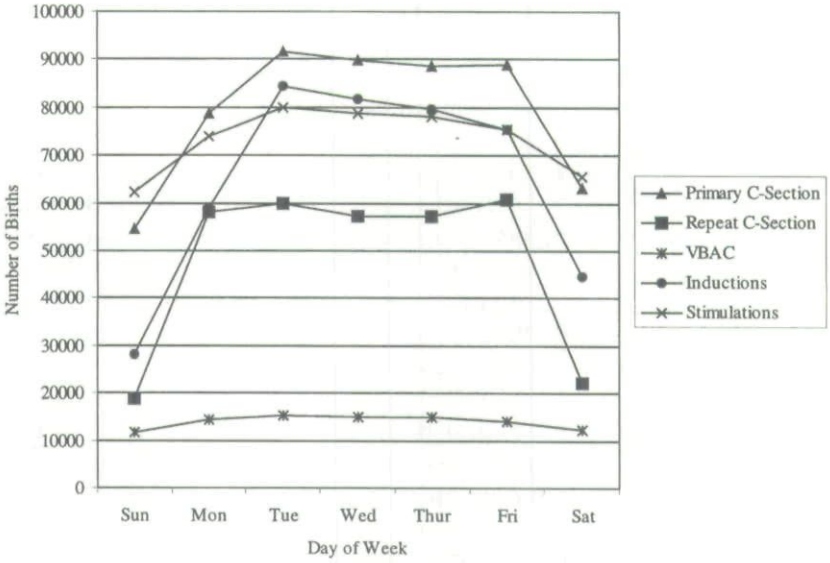


FIG. 1.—1993 distribution of birth procedures by day of week. Source: Authors' tabulations from 1993 U.S. natality microdata (National Center for Health Statistics).

the number of births in the last week of December to be greater than the number of births in the first week of January.[4] Using data from U.S. natality records, figure 2 considers this possibility by illustrating the daily counts during these two-week periods between December 1978 and January 1992. The black columns represent the final seven days of December and the white columns represent the first seven days of January for each contiguous two-week pairing. The fewest births in this two-week period occur on December 25 (Christmas Day), with January 1 and other weekend days also having low birth counts. The peak number of births occurs on either December 28, 29, or 30 in all but one year. The spike in the number of births preceding the end of the year suggests that the timing of births may be correlated with taxes. The advantage of the natality data is that they include almost all births in the United States. However, this source lacks crucial data on household incomes and family structure necessary to conduct a multivariate analysis of the relationship between taxes and the timing of births.

[4] We focus on a seven-day time period, before and after the end of the year, to avoid contaminating our results with the seasonality of births (Seiver 1980; Lam, Miron, and Riley 1994; Lam and Miron 1996; Ringel 1996). The seasonality of births is nontrivially persistent over time, peaking in August and September and reaching a trough in April and May.

TABLE 2

1993 Distribution of Birth Procedures by Day of Week

| | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|---|
| Total births | 455,767 | 593,356 | 641,983 | 634,358 | 631,112 | 622,435 | 490,417 |
| Vaginal births | 374,293 | 445,583 | 478,295 | 475,421 | 473,161 | 460,748 | 396,300 |
| Primary cesarean section | 54,409 | 78,645 | 91,594 | 89,815 | 88,592 | 88,945 | 63,105 |
| Repeat cesarean section | 18,926 | 58,154 | 60,026 | 57,116 | 57,218 | 60,669 | 22,102 |
| Vaginal birth after cesarean | 11,661 | 14,317 | 15,239 | 15,029 | 14,830 | 14,149 | 12,359 |
| Inducements | 28,292 | 58,904 | 84,324 | 81,883 | 79,565 | 75,576 | 44,760 |
| Stimulations | 62,175 | 73,197 | 79,863 | 78,629 | 78,003 | 75,437 | 65,481 |

Source.—Authors' tabulations from 1993 U.S. natality microdata.
Note.—These procedures are not mutually exclusive. For example, inducing labor does not preclude a cesarean delivery.

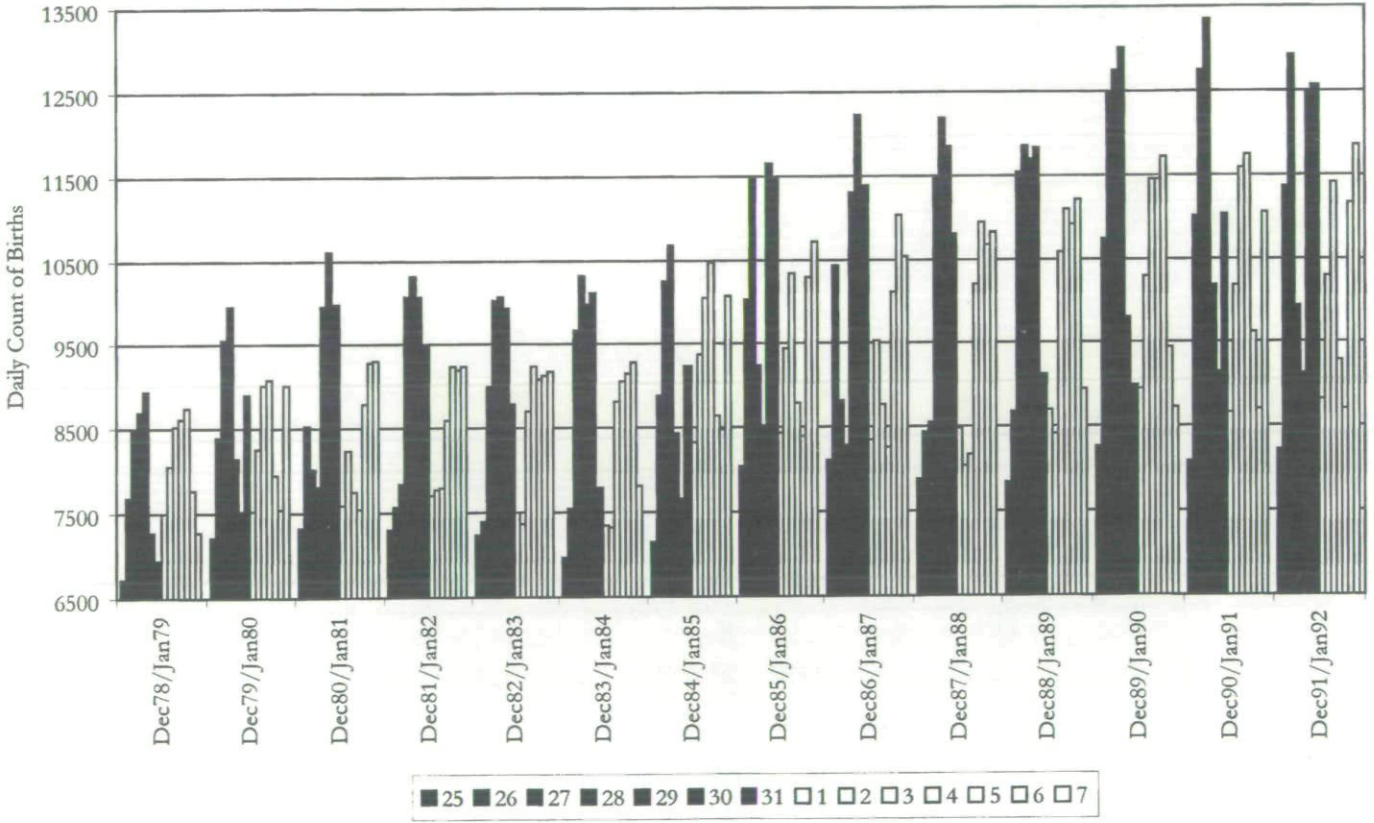


FIG. 2.—Distribution of births over the last week of December and first week of January. Source: Authors' tabulations from *Vital Statistics of the United States,* vol. 1, *Natality* (1989–92) and National Center for Health Statistics data sets, 1978–88.

To conduct such an analysis, we use data from the NLSY supplemented with the NLSY Child Sample. The full NLSY sampled 12,686 individuals in 1979 who were aged 14–21. The survey collects annual data on each of the respondents through 1994. We limit our sample to families that had births in the two-week period bounded by December 24 and January 8 of each year. After we drop one of the observations in two sets of twins, observations that report not filing taxes or report zero AGI, and observations with missing information on variables used to calculate taxes or estimate our regressions, our final sample contains 170 births.

The explanatory variable of interest is the marginal tax benefit of an early birth. We estimate this benefit by first calculating each unit's tax liability as though the child had been born in December. We then calculate the unit's tax liability as though the child had not been born by the end of the year. The difference between the former and the latter is our measure of the relative tax benefit of having the child in the last week of December.[5]

In table 3 we present summary statistics for our sample. We convert all nominal dollar variables to 1996 dollars. Fifty-two percent of the babies in this sample were born in the last week of December. For babies born in the last week of December, the average family's tax liability declined by $433 because of the birth of the child. For babies born in January, if the child had been born prior to the end of the year, the family's taxes would have been only an average of $366 less in that year.[6]

The decision whether to have a December rather than a January birth arises from an underlying difference in utility between the two

[5] All tax liability calculations carefully reflect current-year tax parameters. We determine filing status on the basis of reported marital status and reported number of children. We add two personal exemptions for the two cases of twin births. We assume that all married individuals file joint tax returns, all single persons with children file head of household returns, and all childless, unmarried individuals file single returns. We use the reported number of exemptions or, if the number is unreported, we assume that the total number of exemptions is the respondent, spouse (if one is present), and the total number of children. We have no information on the itemized deductions of the families, and as in earlier literature, we assume that all filers take the standard deduction (Alm and Whittington 1997; Dickert-Conlin and Houser 1998). This assumption would lead us to overestimate the marginal tax rate and therefore the tax benefits of an additional child for some families that itemize deductions.

[6] We cannot reject the hypothesis that the mean or median changes in tax benefits arose from the same distribution at standard significance levels. Examined from another angle, however, the December births yielded higher tax benefits. We reject the hypothesis that the percentage difference between the tax benefits in the two periods is zero. The natural log of the variable for December births is statistically different from January births at the 4 percent significance level ($t$-statistic $-2.05$).

TABLE 3

MEANS AND STANDARD DEVIATIONS FROM NLSY DATA

| | Full Sample | December Births | January Births |
|---|---|---|---|
| Fraction of births in last week of December | .52 | 1 | 0 |
| Change in tax liability associated with a December birth (1996 dollars) | 400.52 (308.22) | 432.53 (338.18) | 366.16 (270.31) |
| Annual AGI (1996 dollars) | 32,512.55 (26,800.44) | 35,803.14 (27,753.97) | 28,981.18 (25,443.64) |
| Mother's annual earnings (1996 dollars) | 9,164.72 (11,084.26) | 9,789.85 (12,550.88) | 8,493.85 (9,287.96) |
| First or second birth? (1 = yes) | .76 (.43) | .69 (.46) | .84 (.37) |
| Married? (1 = yes) | .75 (.43) | .78 (.41) | .72 (.45) |
| Mother's age at time of birth (years) | 24.37 (4.04) | 24.47 (4.20) | 24.27 (3.90) |
| Mother's education at time of birth (years) | 12.30 (2.61) | 12.11 (2.89) | 12.50 (2.28) |
| Urban residence? (1 = yes) | .80 (.40) | .85 (.36) | .74 (.44) |
| Mother is African-American? (1 = yes) | .23 (.42) | .24 (.43) | .22 (.42) |
| Observations | 170 | 88 | 82 |

SOURCE.—Authors' tabulations from the NLSY.

NOTE.—Standard deviations are in parentheses. This sample from the NLSY is restricted to those births that occurred in the last week of December or the first week of January, for which all of the variables above were defined.

choices. We do not observe this underlying difference in utility; however, we express it as

$$Y^* = \beta_0 g + \mathbf{X}\beta + \epsilon, \quad \epsilon \sim N(0, 1).$$

In this representation, $g$ is the tax benefit associated with a December birth relative to a January birth. The $\mathbf{X}$ matrix consists of observable nontax incentives affecting the decision to have a December birth. The value of $Y^*$ is empirically unobservable; however, we observe

$$Y = \begin{cases} 1 \text{ (a December birth)} & \text{if } Y^* > 0 \\ 0 \text{ (a January birth)} & \text{if } Y^* \leq 0. \end{cases}$$

With the assumption that $\epsilon$ is normally distributed, we can estimate the equation above with a probit regression. A testable implication is that, all else equal, higher tax benefits are positively correlated with a December birth relative to a January birth.

The holiday season itself is a reason that the distribution of births

may not be uniform over the last week of December and the first week of January. The holidays at the end of December may provide additional vacation days for the parents, making the timing of childbirth more convenient and, therefore, more likely during that time. However, given that the holidays are a particularly busy time of year, parents may prefer to schedule births after the holiday. We attempt to control for nontax factors that determine whether the parents might prefer a birth in late December over a birth in early January, although we have few predictions about the signs of these coefficients.

First, we include the family's AGI as an independent variable. Higher income may reflect access to physicians who are willing to participate in the timing of a birth. Additionally, we include mother's age, race, marital status, and education to collectively proxy for the amount of control or preference over the timing of births. We also include a dummy variable that is equal to one if the family lives in an urban area as an indicator of the type and possibly the proximity of medical care. Logistics is one justification for inducing labor according to guidelines of the American College of Obstetricians and Gynecologists (ACOG) (1995). To control for the fact that mothers with a higher opportunity cost of taking maternity leave may opt for a December birth, we include mother's earnings in our regressions. We expect that such mothers may prefer late-December births because they can use the Christmas holidays to supplement their regular maternity leave. Finally, we include a dummy variable that is equal to one if the child is the first or second child born to the mother. Families with multiple children may be more comfortable with the birth process and, therefore, more willing to manipulate the date of delivery.

Table 4 presents the results of our probit model, expressed as marginal effects evaluated at the point of sample means. Column 1 reports the marginal effects and standard errors of the explanatory variables in our primary specification. The coefficient on the variable for change in tax liability is significant and has the expected positive sign: mothers with more to gain in terms of lower tax liability are more likely to have a child during the last week of December than during the first week of January. The birth order of the child is also found to be correlated with the timing of the birth. Specifically, if the child is at least the mother's third child, she is more likely to have the child in late December. Mother's education is negatively and statistically significantly related to the birth of a child in late December rather than early January. Not surprisingly, no other variables are significantly correlated with the timing of birth at the standard levels.

TABLE 4

MARGINAL EFFECTS FROM PROBIT MODEL

| | SPECIFICATION ($N = 170$) | |
|---|---|---|
| | (1) | (2) |
| Change in tax liability from December birth (thousands) | .344** | .2269*** |
| | (.1596) | (.1907) |
| AGI (thousands) | .0022 | −.0041 |
| | (.0023) | (.0060) |
| Change in tax liability from December birth × AGI (thousands) | | .0091*** |
| | | (.0080) |
| Mother's earnings (thousands) | .0032 | .0033 |
| | (.0045) | (.0046) |
| First or second child? (1 = yes) | −.2334** | −.2505** |
| | (.1084) | (.1081) |
| Mother's education | −.0338* | −.0304 |
| | (.0192) | (.0197) |
| Marital status | .1588 | .2039 |
| | (.1221) | (.1260) |
| Urban residence? (1 = yes) | .1614 | .1653* |
| | (.0967) | (.0964) |
| Mother's age | −.0159 | −.0174 |
| | (.0122) | (.0125) |
| African-American? (1 = yes) | .0778 | .0713 |
| | (.1123) | (.1126) |

SOURCE.—Authors' tabulations from the NLSY.

NOTE.—The dependent variable equals one if the birth took place in the last week of December and zero if it took place in the first week of January. Standard errors for marginal effects at the point of sample means are in parentheses.

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Jointly significant at the 6 percent level.

To consider the possibility that families are not equally responsive to tax incentives at all levels of income, we estimate another specification that includes an interaction term between the change in tax liability and adjusted gross income. The results are in column 2 of table 4 and are very consistent with those of our primary specification. The coefficients on the tax and interaction terms are positive and jointly significant at the 6 percent level.[7] The positive coefficient on the interaction term suggests that the responsiveness to the tax incentives increases with income. For AGI above $12,000, the marginal effect of the tax benefit is larger than the average marginal effect estimated in column 1.[8]

[7] The coefficients on AGI and the interaction term between AGI and the tax benefit are jointly insignificant, which is consistent with our results in col. 1.

[8] We estimated numerous specifications to test the sensitivity of our choice of statistical assumptions, independent variables, and samples. We consistently find that higher tax benefits are positively correlated with December births. For example, because probit models are not robust to heteroscedasticity and produce inconsistent

In table 5 we simulate how the probability of having the child in late December rather than early January is affected by changes in the tax incentives for children. We use the coefficient estimates from column 1 of table 4, evaluated at the means of the continuous variables. In addition, we assume that the birth occurs to a white, married woman who lives in an urban area. We also assume that the child is the woman's first or second. For this baseline case, the probability that the birth occurs in late December is .516.

A 10 percent increase in the mean tax benefit (from $401 to $441) of having a child raises the probability that the child is born in the last week of December rather than the first week of January by 2.7 percent to .530. Assume that 75,000 children are born in the last week of December. As a result of this 10 percent increase, an additional 2,025 births are timed for the end of December rather than early January. At this average tax benefit, the annual loss in tax revenue associated with this behavioral change is $893,000. If we increase the tax benefit of having a child by $500, which is equal to the proposed child tax credit in the Tax Relief Act of 1997 (Commerce Clearing House 1997), the probability of having the child in late December increases by 26.9 percent to .655.[9] This suggests an increase of approximately 20,175 births in late December with a corresponding decrease in early January. This behavioral change would imply a tax expenditure of over $18 million ($901 times 20,175 births). When we simulate eliminating the tax incentives for having a child, we find that the probability that the child is born in late December falls to .380—a 26.4 percent decline. This change in behavior would reduce tax expenditures by $7.9 million.

In one sense, these estimates of the tax costs of timing births are underestimates because of our focus on the marginal births timed within the last week of December. We are ignoring the possibility that mothers naturally plan births for November or early December to take advantage of the tax benefit while avoiding the costs of medically manipulating a late-December birth.

## IV. Nontax Costs

The nontax costs and benefits of manipulating the timing of a birth are harder to assess. The subsidy distorts the price of a December

estimates of the population parameters under misspecification (Yatchew and Griliches 1985), we compare the estimated coefficients from the probit with the estimated coefficients in a linear probability model. The estimates are virtually identical, suggesting that heteroscedasticity is not a problem in our probit estimates.

[9] Increasing the average marginal tax benefit of childbirth by $500 is an upper bound to the effect of the child tax credit because of the credit's proposed phaseout range and incomplete refundability.

TABLE 5

INTERPRETING THE MAGNITUDE OF THE TAX CHANGE ON THE PROBABILITY OF A DECEMBER BIRTH

| Marginal Tax Benefit of Childbirth (1996 Dollars) | Probability of Birth in Last Week of December Rather than First Week of January | Percentage Change from Average | Tax Expenditure Change from Average Due to Change in Number of December Births |
|---|---|---|---|
| Average tax benefit: $401 | .516 | . . . | . . . |
| Eliminate benefit: $0 | .380 | −26.4 | −$7.9 million |
| Increase mean by 1 percent: $405 | .517 | .3 | $91,000 |
| Increase mean by 10 percent: $441 | .530 | 2.7 | $893,000 |
| Increase mean by $500: $901 | .655 | 26.9 | $18 million |

SOURCE.—Authors' tabulations from col. 1 of table 4.

NOTE.—We assume that the birth order is first or second and the woman is married, lives in an urban area, and is not African-American. We assume the means of the continuous variables and that 75,000 births occur in the last week of December.

birth, which results in a deadweight loss: too many resources are allocated toward childbirth in late December and away from other procedures. This reallocation can be quite large if, for example, an uncomplicated vaginal birth that would naturally occur in early January is converted to an induced or cesarean delivery in late December.[10] Because most childbirth expenses are covered by insurance, explicit cost differences in procedures are not borne by the mother but primarily represent a transfer from insurance companies to physicians and hospitals.[11]

The health costs to mothers and babies may be thought of as an additional deadweight loss resulting from the tax. The size of these costs is controversial. For example, the 1995 ACOG guidelines on inducement cite no evidence that inducing labor under recommended circumstances results in serious side effects. However, Solomon and D'Alton (1997, p. 293) report that "prematurity and an increased rate of cesarean section due to failed induction" are undesirable side effects. These efficiency costs may be partially offset by lower opportunity costs for the physician and mother associated with timing the exact date of birth.

In an expansive literature review, Keeler and Brodie (1993) conclude that "to enable mothers and physicians to make more informed trade-offs, we need better estimates of the true health, satisfaction and financial costs of labor and postpartum morbidity following vaginal delivery and C-section" (pp. 392–93). Their conclusion seems especially relevant in light of the increased acceptance of inducing labor (78 percent increase between 1989 and 1995 according to Ventura et al. [1997]) and the recent policy changes that have increased the tax incentives for manipulating the date of birth to late December rather than early January.

## V. Conclusions

The federal personal income tax system provides financial incentives for childbirth through the structure of the personal exemption, the

[10] The *Washington Post* (Evans 1994) reports that the total cost of having a child in a local hospital via induced labor was more than $7,000, but that "lower rates apply to vaginal deliveries that were not induced or required no epidural, and higher rates when a woman has cesarean section. . . . The theory is that with more procedures or higher risks more staffing will be needed."

[11] Keeler and Brodie (1993) suggest that a typical vaginal delivery will have charges of $6,000 compared with $9,000 for a cesarean delivery. They note that the insured mothers pay out of pocket only a small part of the charges for maternity care (11 percent in 1986). We were unable to find more recent, comparable data. However, a brief survey of characteristics of major insurance plans, such as those provided by Humana and United Healthcare, found that out-of-pocket expenditures are small for most families.

standard deduction, and the EITC. In this system, a child born on December 31 receives all the tax benefits of being born any time in that year, but a child born one day later, in the next calendar and tax year, provides no tax benefits for the previous year. Using a sample of children from the NLSY born in the last week of December and the first week of January for the years 1979–93, we show that the probability that the child is born in the last week of December rather than the first week of January is related to tax benefits. Our regression analysis suggests that if we increase the tax benefit of having a child by $500, which is equal to the proposed child tax credit in the Tax Relief Act of 1997, the probability of having the child in the last week of December rather than the first week of January increases by 26.9 percent. Because our analysis covers a time period of increased acceptance of induced labor, we expect that taxes may increasingly play a role in determining the timing of childbirth.

## References


Alm, James, and Whittington, Leslie A. "Income Taxes and the Timing of Marital Decisions." *J. Public Econ.* 64 (May 1997): 219–40.

American College of Obstetricians and Gynecologists. *Induction of Labor.* Tech. Bull. no. 217. Washington: American Coll. Obstetricians and Gynecologists, 1995.

Auten, Gerald E.; Burman, Leonard E.; and Randolph, William C. "Estimation and Interpretation of Capital Gains Realization Behavior: Evidence from Panel Data." *Nat. Tax J.* 42 (September 1989): 353–74.

"Baby Born on Christmas Still Counts as Deduction." *Pantagraph* (January 30, 1997), Kiplinger's Money Power col.

Burman, Leonard E., and Randolph, William C. "Measuring Permanent Responses to Capital-Gains Tax Changes in Panel Data." *A.E.R.* 84 (September 1994): 794–809.

Commerce Clearing House. *Tax Briefing: Taxpayer Relief Act of 1997.* http://tax.cch.com/Lite/taxleg/taxleg-l.htm. 1997.

Dickert-Conlin, Stacy, and Chandra, Amitabh. "Baby New Year or Baby New Year's Eve? Taxes and the Timing of Births." Working Paper no. E-199-97. Lexington: Univ. Kentucky, Dept. Econ., 1998.

Dickert-Conlin, Stacy, and Houser, Scott. "Taxes and Transfers: A New Look at the Marriage Penalty." *Nat. Tax J.* 51 (June 1998): 175–217.

Epps, Roselyn Payne, and Stewart, Susan Cobb, eds. *The American Medical Women's Association's Guide to Pregnancy and Childbirth.* New York: Dell, 1996.

Evans, Sandra. "How Much Is That Baby in the Window?" *Washington Post* (November 29, 1994), Washington Health sec., p. WH12, col. 1.

Gelardi, Alexander M. G. "The Influence of Tax Law Changes on the Timing of Marriages: A Two-Country Analysis." *Nat. Tax J.* 49 (March 1996): 17–30.

Internal Revenue Service. *Your Federal Income Tax for Individuals.* Publication no. 17. Washington: Internal Revenue Service, 1996.

Keeler, Emmett B., and Brodie, Mollyann. "Economic Incentives in the

Choice between Vaginal Delivery and Cesarean Section." *Milbank Q.* 71, no. 3 (1993): 365–404.

Lam, David A., and Miron, Jeffrey A. "The Effects of Temperature on Human Fertility." *Demography* 33 (August 1996): 291–305.

Lam, David A.; Miron, Jeffrey A.; and Riley, Ann. "Modeling Seasonality in Fecundability, Conceptions, and Births." *Demography* 31 (May 1994): 321–46.

Levesque, William R. "Baby Doesn't Add Up to Tax Refund." *St. Petersburg Times* (May 25, 1997).

Morian, Jennifer. "A Brilliant Deduction: Baby Arrives Minutes before Midnight Dec. 31." *Atlanta J.-Constitution* (January 2, 1990), sec. J, p. 1.

O'Driscoll, Patrick. "Baby's Five Days Late, Just Short of Tax Break." *Denver Post* (January 2, 1996), sec. B, p. 1, col. 1.

Randolph, William C. "Dynamic Income, Progressive Taxes, and the Timing of Charitable Contributions." *J.P.E.* 103 (August 1995): 709–38.

Ringel, Jeanne. "It's Too Darn Hot! Using Temperature as an Instrument for Teen Fertility." Manuscript. Washington: Brookings Inst., October 1996.

Seiver, Daniel A. "Trend and Variation in the Seasonality of U.S. Fertility, 1947–1976." *Demography* 22 (February 1985): 89–100.

Solomon, Julia E., and D'Alton, Mary E. "Induction of Labor." In *Management of Labor and Delivery,* edited by Robert K. Creasy. Malden, Mass.: Blackwell Sci., 1997.

Ventura, Stephanie J.; Martin, Joyce A.; Curtin, Sally C.; and Mathews, T. J. "Advance Report of Final Natality Statistics, 1995." *Monthly Vital Statis. Report* 45 (suppl; June 10, 1997).

Ventura, Stephanie J.; Martin, Joyce A.; Mathews, T. J.; and Clarke, Sally C. "Advance Report of Final Natality Statistics, 1994." *Monthly Vital Statis. Report* 44 (suppl.; June 24, 1996).

Whitley, Tyler. "Babies Games, Parties Get 1997 Off to a Good Start." *Richmond Times-Dispatch* (January 2, 1997), sec. 1, p. 1.

Yatchew, Adonis J., and Griliches, Zvi. "Specification Error in Probit Models." *Rev. Econ. and Statis.* 67 (February 1985): 134–39.