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The Reality of SCHIP and Uninsureds: Do SCHIP Mandatory Wait Periods Increase the Uninsured Rolls?

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Donald Nichols

Michael Plotzke

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Economic Research Initiative on the Uninsured
University of Michigan
555 South Forest Street, 3rd Floor
Ann Arbor, MI 48104-2531

Abstract

Due to the low risk of not insuring a healthy child for a short, finite period of time, it's plausible that SCHIP mandatory wait periods, where a child must forgo private insurance for several months before enrolling in SCHIP, do not provide enough incentive for parents to keep their children enrolled in private insurance. Using data from the 1996 Survey of Income and Program Participation (SIPP), we find that children eligible for SCHIP in states with shorter mandatory wait periods are more likely to be uninsured during the six months following the implementation of SCHIP than children in states with no mandatory wait periods. These children also have lower preventative care utilization, but there is no difference in their acute care utilization or health after one year.

I. INTRODUCTION

Title XXI of the Balanced Budget Act of 1997 established the State Children's Health Insurance Program (SCHIP). This program is designed to provide health insurance for children from low-income households that earn too much to qualify for traditional Medicaid. Because SCHIP enables low-income families to obtain health insurance at rates below the cost of private health plans (including subsidized group plans offered by employers), some families may be inclined to disenroll their children from private health insurance plans and instead enroll them in SCHIP – a phenomenon referred to as "crowd-out."

Federal legislators recognized the potential for this problem and required that each state develop measures to prevent crowd-out from occurring. Many states complied with this mandate by requiring a mandatory wait period before enrollment in SCHIP is possible. That is, if a child had previously had private health insurance, these states required that child be uninsured for a certain number of months before she could enroll into SCHIP. We refer to the length of time as the mandatory waiting period. However, the value of the heavily subsidized health insurance through SCHIP may be great enough that the mandatory wait period would not be a strong enough deterrence for potential "crowd-outers". In which case, the regulation would simply contribute to the number of children who are uninsured for some part of the year. So at any time within a year there may be a higher uninsured rate due to the existence of SCHIP mandatory wait periods.

There is evidence that crowd-out is a common consequence of public health insurance programs. It is widely thought that it is a particularly important issue for the class of people targeted by SCHIP – which may be the reason for the government's inclusion of provisions to prevent crowd-out (Kronick and Gilmer, 2002; Lo Sasso and Buchmueller, 2004). However, there has been little research into whether the most common form of policies designed to prevent crowd-out in SCHIP (mandatory wait periods) actually have any impact on a household's decision to switch from private to public insurance (Lutzky and Hill, 2001; Lo Sasso and Buchmueller, 2004). While previous research provides suggestive evidence, this project will result in stronger evidence as to whether potential crowd-outers are deterred by mandatory wait periods from becoming crowd-outers or whether they are willing to allow their children to endure short periods of uninsurance.

We hypothesize that it is likely that this popular form of preventative crowd-out measure is not only ineffective, but is interfering with the success of SCHIP by generating new uninsured children. Findings from this study will help determine the overall success that SCHIP has at reducing uninsured low-income children. While the enrollment numbers show that children are benefiting from the existence of SCHIP[1] (Lave et. al., 1998; Slifkin, Freeman, and Silberman, 2002; Lo Sasso and Buchmueller, 2004), it is possible that enrollment in SCHIP may cause some children to go for periods without insurance. Therefore, they may go without healthcare or incur costs for society due to an increased reliance on uncompensated care. Those outcomes detract

[1] While the true measure of benefits would include an indication of the health improvement in the targeted population (Joyce and Racine, 2003), here the benefit is simply having health insurance.

from the success of SCHIP. This research will also inform policy makers of the effectiveness of mandatory wait periods in reducing crowd-out. This research is particularly timely as the federal government will have to reauthorize federal funding of the SCHIP program by September 30, 2007. Any changes in the level of funding may require states to change aspects of their program so they can better meet their goal of providing health insurance to those children without access to health insurance. Altering the mandatory waiting period may be one way to accomplish that goal.

We find that the mandatory wait periods do not completely deter crowding-out of private health insurance, but leads to uninsurance. Compared with SCHIP eligible residents of states with no mandatory wait period, SCHIP eligible residents of states in which there are mandatory wait periods are more likely to be uninsured during the six months following the implementation of SCHIP in their state. The positive relationship between uninsured status and the length of the mandatory wait period is decreasing and becomes negative somewhere around 7.5 months. Thus, the states that require twelve months of no coverage seem to create enough risk to discourage eligibles from crowding-out. In these states we see eligible children without insurance at only 30% of the rate of similar children in states with no mandatory wait period, while children in states with small periods are more than twice as likely to be uninsured. Also, the mandatory wait periods reduce the utilization of routine, preventive care but not acute care. We also find that mandatory wait periods do not lead to deterioration of health status after one year.

In the next section we review literature that has measured the existence of crowding-out and the effectiveness of SCHIP at preventing crowd-out. Section 3 sets up a model that describes the

decision to remove a child from private health insurance and enroll her in SCHIP. This section also discusses some of the dynamics of the model and our empirical strategy for testing it. Next, we describe the data used in our analysis. Our results are presented in Section 5. Finally, we conclude in Section 6.

II. LITERATURE REVIEW

Government subsidized public health insurance may entice people with private health insurance to switch to the public insurance program, a phenomenon called crowd-out. Many researchers have tried to estimate how much crowd-out occurs due to public health insurance. In particular, many authors have examined crowd-out caused by the Medicaid expansions for children and pregnant women during the late 1980's to early 1990's.

Cutler and Gruber (1996) estimated that up to 50% of the increase in Medicaid coverage during that time period for both children and pregnant women was associated with a reduction in private insurance coverage. Using males age 18-44 (who were unaffected by the expansion) as a control group, Dubay and Kenney (1997) estimated the Medicaid expansion caused only 14% crowd-out among pregnant women. Blumberg, Dubay, and Norton (2000) used the SIPP dataset to conclude that if the Medicaid expansion did not occur, 4% of the children enrolled in the Medicaid expansion could have enrolled in private insurance. Further, if the authors only considered children who had private insurance prior to the expansion, 23% of the children enrolled in the Medicaid expansion could have kept their private insurance rather than switching to Medicaid.

The problem of crowd-out is not merely limited to that particular Medicaid expansion. Examining other public insurance programs has also provided insight into how different populations respond to the possibility of crowd-out. Kronick and Gilmer (2002) looked at four state run public health insurance programs that targeted low-income workers. Unlike the Medicaid expansion, these programs instituted anti-crowd-out provisions such as cost sharing and mandatory wait periods. Even with these provisions, the authors estimated that 45% of the increase in enrollment in these four state programs was caused by crowd-out. Although, the crowd-out was concentrated in the two programs in which an enrollee's eligibility depended on whether she had access to employer provided insurance. Glied and Stabile (2001) examined anti-crowd-out legislation that required employers who offered private health insurance to their workers also offer it to their Medicare-eligible workers. However, the authors argued that this anti-crowd-out provision was not effective by showing a substantial number of elderly workers with private insurance still used Medicare as their primary insurance when they should not have.

Researchers have started to examine the extent to which crowd-out occurs in SCHIP. Lutzky and Hill (2001) interviewed government officials to obtain qualitative evidence on how eighteen states implemented anti-crowd-out policies for SCHIP and to what degree these states thought crowd-out was a problem. Although most states did not consider crowd-out a key issue, some states estimated their programs experienced levels of crowd-out ranging from 5 to 10%. Lo Sasso and Buchmueller (2004) found that after states implemented SCHIP, 9% of those eligible enrolled in public insurance, with crowd-out measured slightly above 45%. The authors also argued that anti-crowd-out provisions that many SCHIP programs established were found to reduce take-up and crowd-out.

The previously mentioned researchers have shown that crowd-out does exist and that current crowd-out prevention measures are not completely effective in controlling all possible crowd-out. However, little attention has been given to the effects of measures that do not completely stop crowd-out such as mandatory wait periods. This is an important issue since often these measures contain negative consequences for those who crowd-out.

III. Model

A. Description

We consider families who are financially eligible for SCHIP and deciding on a strategy for providing health insurance for their children. For simplicity all families have identical preferences for their child's health, h_{st}, and the consumption of some private good, q_t, (which represents the optimal quantity of all other goods and savings). These preferences are additive and given by:

$$u(h_{st}) + v(q_t) \qquad \text{(Eq. 1)}$$

where u and v are both increasing and concave.

Health status has two possible levels: sick and well (h_{1t} and h_{2t}). Each period the family earns a certain income, Y, which can be spent on the health of the child or the private good; and the child has some exogenous health stock, H. The difference in the utility for a family between a child in poor health and a child in good health is greater than the marginal utility gained from the initial dollar spent on the private good, i.e.:

$$u(h_{2t}) - u(h_{1t}) > v'(0) \qquad \text{(Eq. 2)}$$

So in this model we will observe families spending whatever cost (up to their budget constraint) is necessary to secure a good health status for their children. Thus, the maximization problem simplifies to maximizing the amount of the private good. The quantity of private good that a family can consume depends upon the family's income and the expenditures on the child's health. If the child remains well during a period then the amount of private good that can be consumed is *Y*. If the child becomes sick, the parents will pay *C* in order to make the child well. Thus, they will be able to only consume *Y-C*. The likelihood that the child becomes sick, π, is negatively dependent upon the child's health stock at the beginning of the period, *H*. The expected expenditure on the private good is:

$$Y - \pi(H)C \qquad \text{(Eq. 3)}$$

Using the natural log von Neumann-Morgenstern utility function to measure the utility gained from the private good, a family's expected utility for this period is:

$$u(h_{2t}) + \pi(H)\ln(Y - C) + [1 - \pi(H)]\ln Y \qquad \text{(Eq. 4)}$$

However, in order to reduce the risk of a shock to their private good consumption a family is able to purchase health insurance for the child from their employer. In order to do so the family must pay a premium of P_p each period for this private insurance. Also, if the family uses the insurance to provide health care for the child they pay a co-pay in the amount of D_p. If the family chooses to purchase the insurance their utility becomes:

$$u(h_{2t}) + \pi(H)\ln(Y - P_p - D_P) + [1 - \pi(H)]\ln(Y - P_P) \qquad \text{(Eq. 5)}$$

With the introduction of SCHIP the family will have the option of paying both a lower premium for health insurance, P_S, and a lower co-pay for care, D_S, if they switch the child from their employer's health insurance plan into the SCHIP plan. Their utility would increase to:

$$u(h_{2t}) + \pi(H)\ln(Y - P_S - D_S) + [1 - \pi(H)]\ln(Y - P_S) \qquad \text{(Eq. 6)}$$

However, to discourage this crowding-out policy makers implement a mandatory wait period – i.e. a period of time, L, that an eligible child must be without private health insurance before the parents can enroll her in SCHIP. Thus, if the parents decide to enroll her in SCHIP, she must first be without health insurance for the period L before her parents can reap the benefits of higher utility due to the lower premium and co-pay of SCHIP relative to the employer's health insurance.

During the period of no coverage the utility will be the same as in eq (4). When the child becomes covered by SCHIP the family's utility will be the same as that found in eq (6). Given that the child's current age in months is a and that SCHIP coverage lasts until her nineteenth birthday (228 months), the total utility of enrolling in SCHIP is:

$$U_S = \sum_{t=1}^{L} \frac{\{u(h_{2t}) + \pi(H)\ln[Y - C] + [1 - \pi(H)]\ln[Y]\}}{(1+r)^{t-1}} + \sum_{t=L+1}^{228-a} \frac{\{u(h_{2t}) + \pi(H)\ln[Y - P_S - D_S] + [1 - \pi(H)]\ln[Y - P_S]\}}{(1+r)^{t-1}} \qquad \text{(Eq. 7)}$$

While the utility from remaining privately insured through an employer is:

$$U_P = \sum_{t=1}^{228-a} \frac{\{u(h_2) + \pi(H)\ln[Y - P_P - D_P] + [1 - \pi(H)]\ln[Y - P_P]\}}{(1+r)^{t-1}} \qquad \text{(Eq. 8)}$$

When deciding between staying with the private insurance and crowding-out, the parents will compare these two utilities. If the utility of the SCHIP enrollment is greater than that from remaining privately insured, the parents will consider switching the child from private insurance to SCHIP. We assume that each family has some minimum additional utility, $\underline{u}_t$, that they must gain (perhaps, to overcome the stigma of being enrolled in a social program or to compensate for

the time cost of completing the enrollment process for SCHIP) before switching the child from private health insurance to SCHIP. $\underline{u}_i$ has some distribution such that it is not the same for all families. Thus, the likelihood that families will crowd-out will depend upon the distribution of $\underline{u}_i$ and can be represented by:

$$\mathrm{P}(\text{crowd - out}) = \mathrm{P}(U_S - U_P \geq \underline{u}_i) \qquad \text{(Eq. 9)}$$

In general, it will be true that this likelihood will increase as the following difference (written in terms of two SCHIP enrolled periods – no-coverage and post-no-coverage) grows.

$$\begin{aligned}\Delta U &= U_S - U_P \\ &= \sum_{t=1}^{L} \frac{\left\{\pi(H)\ln\left[\frac{Y-C}{Y-P_P-D_P}\right] + [1-\pi(H)]\ln\left[\frac{Y}{Y-P_P}\right]\right\}}{(1+r)^{t-1}} + \\ &\qquad \sum_{t=L+1}^{228-a} \frac{\left\{\pi(H)\ln\left[\frac{Y-P_S-D_S}{Y-P_P-D_P}\right] + [1-\pi(H)]\ln\left[\frac{Y-P_S}{Y-P_P}\right]\right\}}{(1+r)^{t-1}}\end{aligned} \qquad \text{(Eq. 10)}$$

To evaluate whether mandatory wait periods increase the uninsured rolls, we must consider how these periods influence the decision to crowd-out. To do so, we first consider the utility difference of crowding-out for a family residing in a state with no mandatory wait period. From equation (10) it is apparent that this difference will be a utility gain since there are no periods of no-coverage – i.e. the child is always insured and the premium and co-pay are lower. However, if the state were to implement a one month wait period the family would face one period of utility from the no-coverage part of the utility function. Since the family has demanded private health insurance in the past, the utility during this period of no-coverage is assumed to be negative. However, the family will receive a utility gain for the remaining periods during which the child is enrolled in SCHIP. Even though these periods of utility gain are discounted, the

magnitude of their sum should be greater than that of the one period of utility loss. Thus, there is a positive likelihood that a family will crowd-out in the presence of a short mandatory wait period.

We look at what happens in the model when the no-coverage period is extended by one month.

$$\Delta(\Delta U) = \frac{\pi(H)\ln\left[\frac{Y-C}{Y-P_S-D_S}\right] + [1-\pi(H)]\ln\left[\frac{Y}{Y-P_S}\right]}{(1+r)^L} \qquad \text{(Eq. 11)}$$

Mathematically, this is the expected percentage difference in utility of not being covered by SCHIP versus being covered. The first term of the numerator represents the utility loss that would occur if the child becomes sick during the additional month of no-coverage versus if she were covered by SCHIP. The second term is the gain of having no insurance when the child is well since the family will pay no premium. Since these families were willing to purchase private insurance rather than remain uninsured, it can be assumed that they would rather be insured by SCHIP during this period rather than uninsured. Thus, this term is negative – i.e. the utility gain of SCHIP versus private health insurance decreases as the mandatory wait period grows.

The appendix shows partial effects of other variables in the model. Increases in health stock and private health insurance premiums and private health insurance co-pays increase the likelihood that a parent will crowd-out and leave the child uninsured if the state has a mandatory wait period. However, as the SCHIP premium, SCHIP co-pay, and the child's age grow parents are less likely to crowd-out and leave the child uninsured. The marginal effect of income negatively depends on the child's health stock.

Our model cannot determine the marginal effect of an additional child. However, using information about the pricing of SCHIP and private insurance premiums we can draw some conclusions about its effect. Since the number of enrolled children for which most SCHIP programs charge a marginal cost is greater than that of most private insurance plans[2], the benefit of enrolling the second child (given that their health stocks are similar) in SCHIP will be less than that of the first child. Therefore, we expect the marginal effect of the number of children in the family to be decreasing. Thus, it is possible that at some number of children it will no longer be beneficial for the family to enroll their children in SCHIP.

B. Empirical Analysis

To test whether in the above model, SCHIP creates uninsureds due to crowding-out incentives, we look at the health insurance status of children during the six months after the implementation of SCHIP in their state. We use regression analysis to determine what factors influence whether a child who has private insurance for the six months prior to SCHIP implementation remains insured for the following six months. Thus, the dependent variable will be a dummy variable indicating whether or not the observation was ever without health insurance during these six months. We use a probit model that corrects for correlated error terms between multiple observations from the same household.

[2] Most private insurance programs have no marginal cost for the second (or beyond) child, while many SCHIP programs have an increase in premium through the third or fourth enrolled child.

Each state is able to design its SCHIP program within some federal guidelines. The variation across states provides the identification strategy for testing whether no-coverage periods lead to uninsureds, but it also presents endogeneity issues. Knowing the future of its labor market, price of private health insurance, or other factors that may influence public health insurance demand, state governments may respond in a way that will help contain their cost by discouraging enrollment in SCHIP with long mandatory wait periods. In response to these concerns we estimate a difference-in-difference (***DID***) model. Our treatment group consists of those children whose families qualify for SCHIP. It would seem natural that our control group would be made up of children who do not qualify for SCHIP or any other public health insurance program. However, this group may be too unrepresentative to form our control group since the demand for health insurance may be different for SCHIP eligible families compared to higher income families. Thus, our control group contains children who are not eligible for SCHIP, but whose family income is no more than 50 percentage points above the maximum federal poverty level for enrolling in SCHIP. The treatment in this ***DID*** approach will be the number of months that a child must be without health insurance before her family is able to enroll her in SCHIP. As stated previously, in order to discourage crowd-out of private health insurance many states implemented mandatory wait periods. However, some of these same states also have retroactive coverage. Thus, a family may be reimbursed for services for which it paid during the retroactive period before SCHIP enrollment. Therefore, the true length in which the child is left uncovered is the difference between the mandatory wait period and the retroactive coverage period. This difference (henceforth referred to as the *uncovered period*) will be our main variable of interest. We test to see if families are more likely to be without insurance at some point during the six

months after the implementation of SCHIP if their state's SCHIP program has a positive uncovered period. We also look at the effect of various lengths of uncovered periods.

The estimated model is:

$$\mathrm{P}(\text{NO INSURANCE} = 1) = \Phi\begin{pmatrix} X_i\delta + X_i * elig_i\beta + Z_j\chi + Z_j * elig_i\theta \\ + UNCOVERED\ PERIOD_j\lambda \\ + UNCOVERED\ PERIOD * elig\phi + \omega_t \end{pmatrix} \quad \text{(Eq. 12)}$$

Each observation in this model represents a particular child *i*. $elig_i$ is a binary variable that denotes whether the child is eligible for enrollment for SCHIP in state *j* (her state of residence). The interaction between this variable and our other controls allows us to carry out the ***DID*** estimation. X_i contains characteristics about child *i* and her family which may influence whether she experiences uninsurance. These regressors include race, gender, age, health status, family income, parent's education, and number of children in the family. Other statewide factors that may impact a family's decision to drop health insurance such as mean employee's cost for family health coverage through an employer, its most recent annual growth rate, and other program details are included in Z_j. In order to capture national trends of health insurance coverage across time there is also an annual time trend.

Our main variable of interest is the measure of the uncovered months. We will approach the estimation of this measure in three ways. First, we look at the dummy variable for whether the observation lives in a state where there is an uncovered period for those switching from private insurance to SCHIP. A positive coefficient provides evidence of our hypothesis that crowd-out prevention leads to a period of uninsurance. In addition to variation in whether or not a state had

an uncovered period, there is also variation in the number of uncovered months as seen in Table 1. Among those states with an uncovered period the minimum length is 2 months and the maximum is 12 months. As the theoretical model showed, it is likely that the number of the uncovered months will impact whether a family will risk uninsurance in order to enroll their child in SCHIP from private insurance. Initially, shorter periods of no coverage should not prevent families from crowding-out. However, the marginal effect is negative and since this effect grows with the number of the uncovered months it is likely that for longer uncovered periods people will not attempt to crowd-out, therefore avoiding a period of uninsurance. Thus, we also look at a quadratic form of the uncovered months variable. Lastly, we look at dummy variables for the four different uncovered periods to see if they follow the expected pattern of less likelihood of being uninsured as the uncovered period grows.

Previous researchers who have studied crowd-out of private health insurance due to the expansion of public health insurance raise endogeneity concerns (Currie and Gruber, 1996; Cutler and Gruber, 1996; Ham and Shore-Sheppard, 2005; Lo Sasso and Buchmueller, 2004). In particular their concern was that certain unobserved characteristics (individual and local) that are correlated with SCHIP eligibility might naturally lead to higher of rates of uninsurance. The SIPP dataset allows us to ignore such concerns since we are able to control for the family's economic condition by observing whether either parent has lost or changed jobs during the observed period and whether a loss of insurance was generated to an employer no longer offering coverage. We also directly control for whether the child's health is assessed as poor.

Concern for any uninsurance caused by SCHIP is driven by the access to health care that insurance affords. Thus, we also explore whether children in states with mandatory wait periods are less likely to seek health care and whether they are in worse health. To analyze the utilization of health care we look at two outcomes: whether there was a doctor's visit in the year following SCHIP implementation and whether there was a hospital stay in the year following SCHIP implementation. For health status, we look at whether the reported health status of the child declines during the year following the implementation of SCHIP. The appropriate model for evaluating each of these questions is a probit. Thus, the estimated models are similar to that in equation (12) except that the dependent variables are changed.

IV. DATA

A. Sources

To answer whether SCHIP increases uninsurance we examine the enrollment behavior of children, ages 18 and younger, who had private health insurance for the 6 months prior to the first SCHIP enrollment date in their state. We compare across states the health insurance coverage for the 6 months following the implementation of SCHIP of those children in states without mandatory wait periods to those with various lengths of mandatory wait periods. Our sample consists of children from 24 states. We removed any child who moved to a different state during the study period. Movers are difficult to analyze because they may be eligible for SCHIP in their original state but not their new state, or vice-versa. In the end, we analyzed a sample of 2,745 children.

This project utilizes two main data sources to measure the prevalence of uninsurance resulting from the crowd-out preventing measures of SCHIP programs. The first data source consists of rules and regulations collected from the Centers for Medicare & Medicaid Services (CMS) website on each SCHIP program in our sample. CMS provides fact sheets that summarize each state's program with information on income limits, age limits, cost sharing, medical benefits and how those features have changed since the state implemented the program. We collected any information the fact sheets lacked from the evaluations and annual reports that CMS required each state to submit. If these documents were not available or did not fully explain a state's program, we searched the appropriate state government website for other documents relating to their SCHIP program. Finally, if we still were missing information, we contacted the administrative office in charge of that SCHIP program.

The second major data source used in this paper is the 1996 cohort of the U.S. Census Bureau's Survey of Income and Program Participation (SIPP). The SIPP is a longitudinal survey. The 1996 cohort of the SIPP has 4 years of monthly observations on demographic, income, and health insurance information for a large sample of U.S. residents. Each person in the sample was interviewed every 4 months, up to 12 times, and asked a core set of questions that were repeated during every interview and also a set of topical questions that were only asked during certain interview sessions.[3] The SIPP asked many topical questions that were useful for this project

[3] This style of questioning may hinder a respondent from providing accurate answers. For example, respondents tended to say they were or were not covered by Medicaid for every month of the four month increment that the interview covered. It was rare for respondents to say they were enrolled in Medicaid for only a portion of that 4 month increment. It seems unlikely this

including questions regarding health status, health care utilization, and health care expenditures from the previous year.

Each observation in our dataset corresponds to a child 18 years old or younger and includes both the child's interview responses and relevant responses of their parents or guardians. In the 1996 cohort, during the first interview period, there were initially 36,957 children interviewed. However, we only included in our analysis those children who SIPP interviewed at least once during the 6 months before their state's SCHIP program was implemented and who were also interviewed during the 6th month after the implementation of their state's SCHIP program.[4] As mentioned previously, only those children who had health insurance all 6 months prior to the state's implementation of SCHIP were included in the sample.

Merging the CMS and SIPP data, we determined if a child was eligible for SCHIP based upon the age limits and income limits each state set for their program. To determine if a family's income fell within the appropriate range, we checked the parent's current month's total income,

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would occur unless respondents applied their Medicaid coverage in the month they were surveyed to each of the previous 3 months. This phenomenon referred to as seam bias is also discussed in Blumberg, Dubay, and Norton (2000).

[4] For children who did not have an observation 6 months prior to the implementation date, the observation that was closest to 6 months before (without exceeding 6 months and occurring at least one month before implementation) was used. 96.6% of the sample had an observation 6 months before the implementation date.

their last month's total income, and their previous year's total income.[5] If any of those amounts fell within the appropriate income range and the child was of the appropriate age, we labeled the observation as eligible for SCHIP during that month.[6] A few states were dropped from the sample because the percentage of interviewed children who were eligible to enroll in SCHIP was too small to be representative. These states include California, Indiana, Kentucky, Louisiana, Minnesota, Texas, and Wisconsin. Also, SIPP did not differentiate between two groups of states, Maine and Vermont; North Dakota, South Dakota, and Wyoming. Thus, these states were dropped from the analysis.

Additionally, we used the Medical Expenditure Panel Survey (MEPS) – Insurance` Component to gather information on the average employee contribution for family health coverage through an employer for a particular state during a particular year. MEPS did not publish estimates of the average employee contribution for every state year combination we analyze. As a result, we dropped an additional 13 states from the analysis.[7] In the end, the analysis included 2,745 observations from 24 states. [8]

[5] An application for SCHIP enrollment typically said the applicant could submit the proof of income for any of those time periods.

[6] See Appendix B for additional information on determining eligibility for SCHIP using the SIPP.

[7] These states are Alaska, Delaware, Washington DC, Idaho, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, Rhode Island, Utah, and West Virginia.

[8] The SCHIP program in Tennessee was too complex to analyze due a separate publicly funded health insurance program that coexisted with their SCHIP program. Therefore, this state was also dropped from the sample.

B. Variables

For the variables used in our analysis, Table 2 provides variable names and definitions. Table 3 contains various means for variables from our above model.

Our key dependent variable in the determination of whether the mandatory wait periods create new uninsured children is NO INSURANCE. It is a dummy variable for whether or not the observation ever reported not having insurance during the six months following the implementation of SCHIP in her state. The uninsurance rate of children who are eligible for enrollment in SCHIP is greater than that of children who are near eligible, our control group. This is our first indication that new uninsured are created.

We found in our model that we should expect that the uninsured rate will be greater in states with shorter wait periods than states without any wait period and decrease as the period grows. In the descriptive statistics of Table 3 we find this pattern. The uninsurance rate is greater among children with 2 uncovered months than those with no uncovered period. The uninsurance rates drop thereafter and are less for children with 12 uncovered months than those without an uncovered period.

V. RESULTS

The uninsurance regression results are presented in Table 4. Each column of this table differs in its measurement of the uncovered period. Column I simply uses a dummy variable for whether

the SCHIP program has an uncovered period prior to enrollment. The next column quadratically models the number of uncovered months. The final model estimates a coefficient for each observed uncovered period length. The ***DID*** approach estimates a separate marginal effect for the dependent variables for the control and treatment groups. Here we only present the coefficient estimates of the treatment group. This represents the behavioral differences between an eligible child in a state with no uncovered period and an eligible child in a state with an uncovered period[9].

The coefficient estimates presented in the table are not the traditional probit model coefficients. Instead, we present the marginal effects of the likelihood that an observation will be uninsured for at least one month during the six months following the implementation of SCHIP. These marginal effects are calculated at the mean of the control variables.

We find support of prior research that children who reside in states where the SCHIP program is an expansion of Medicaid (versus a stand-alone program) are around 45% less likely to be uninsured. However, the insignificance of the coefficients of other program characteristic should not be interpreted as not having an effect on SCHIP enrollment. Recall that the dependent variable is uninsurance, not enrollment. Thus, these variables may have a negative impact on enrollment, but if the states with lower deductibles and premiums are also the states with no

[9] A similar table (Appendix Table 1) is estimated using all non-eligible children as the control groups. In general the coefficient estimates are similar to those in Table 3 except that the magnitudes are smaller.

uncovered period, then it would appear that they have no impact on uninsurance as predicted by the model[10].

Some of the model's predictions about how various child and family characteristics should impact the insurance enrollment are supported by our estimates. An increase of $100 in family income significantly decreases the likelihood that the child will be without insurance by as much as 11%. The models capture a marginally decreasing positive relationship between the number of children in the household and whether a child experiences a period of uninsurance. As the model predicted we find that those children who are considered to be in fair or poor health condition by their parents are 70% less likely to be uninsured during the six months following the state's implementation of SCHIP because of the increased risk of these children becoming sick during the uncovered period.

The focus of this paper is whether the uncovered period fails as a deterrent of crowd-outs and causes new uninsureds. The results in the first column suggest that there is no significant difference in the uninsurance rate of eligibles in states with an uncovered period versus those without. However, this insignificance may be caused by a non-linear relationship. The following two columns support this argument. In Column II we use a quadratic form of the uncovered months. The coefficients of this specification are very significant. We find a decreasing positive marginal effect of the uncovered months on the likelihood of being uninsured during the first six months after a state's SCHIP implementation. From the linear combination

[10] In Appendix Table 2 we find that the mean SCHIP deductibles and premiums are in fact much lower in the states without an uncovered period.

of the uncovered terms, eligibles residing in a state with two, three, and six uncovered months are 35.5%, 46.7%, and 39.2%, respectively, more likely to be uninsured than those residing in a state with no uncovered period. However, those in a state with a twelve uncovered months are less likely to be uninsured by more than 60%. From these coefficient estimates it appears that an uncovered period of about 8 months would be sufficient at preventing crowd-out that would raise the number of children who are uninsured at some point.

The final column of Table 4 includes dummy variables to indicate each existing uncovered period length. These findings show that the quadratic form may also not necessarily fit the data completely. We still find evidence that shorter periods of uncovered lengths are associated with greater uninsurance rates among SCHIP eligibles (children of two month period states are 70% more likely to be uninsured than those of no uncovered states) and that longer periods strongly have lower rates (children in twelve month states are less than 35% as likely as no uncovered states). However, the pattern is not as smooth as that in the quadratic model.

Although we have attempted to isolate the SCHIP uncovered period as the cause of uninsurance, lack of insurance is driven by many factors. Thus, we are concerned about endogeneity issues. If the length of the periods of uninsurance amongst SCHIP eligibles is correlated with the length of the uncovered period in their state, we would have some evidence that the uncovered periods influence the rate of uninsurance among SCHIP eligibles. While the SIPP data collects uninsurance status on a monthly basis, as mentioned earlier the reliability of this data is questionable[11]. Thus, rather than examine the number of reported months of uninsurance, we

[11]Evidence of seam bias is found in our sample with peaks at four and eight months in the

look at the number of four-month periods in which the interviewee reported at least one month of uninsurance during the year following the implementation of SCHIP in their state. In theory, individuals who drop private health insurance for SCHIP in states with mandatory wait periods that are 2 – 4 months long should report uninsurance in one or two periods; those in states that require 5 – 8 months of uninsurance should report two or thee periods; those in states that require 9 or more months of uninsurance should report three. Table 5 gives the results of an ordered probit model using those eligibles who reported having at least one month of uninsurance.

The first column of results reports the coefficient estimates of the ordered probit model. As expected, we find a positive, but decreasing, relationship between the mandatory wait period and the number of periods of uninsurance. The remaining columns look specifically at the marginal likelihood of reporting either 1, 2, or 3 periods of uninsurance. As the number of months of the wait period increases, the uninsured is less likely to report no insurance in only one period. Among the shorter wait periods, as the period increases the uninsured child is more likely to report uninsurance in two periods. However, as the periods get longer, our model predicts that the parents are less likely to discontinue insurance for the child for the purpose of SCHIP enrollment. The ordered probit shows that parents in states with longer mandatory wait periods are more likely to report only one period of uninsurance rather than two or three. These findings support our theory that mandatory wait periods are the cause of uninsurance, particularly in states with shorter mandatory wait periods.

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distribution of the number of months of uninsurance.

The ultimate concern with regard to health insurance is whether the child is able to access needed health services. To answer whether uncovered periods negatively interfere with the health care of children, we look at the utilization of health care and changes in health status in Table 6. The first column shows that among those children in states with fewer uncovered months (and thus at a greater likelihood of uninsurance), as the uncovered months grow they are less likely to have a doctor's visit during the year following SCHIIP implementation. However, the second column shows the SCHIP uncovered months have no effect on the likelihood of a hospital stay. The last column shows that greater required months of uncoverage do not increase the likelihood of reporting deteriorating health after one year. These findings suggest that these uncovered periods may reduce more routine, preventive care but not acute care. Thus, other than producing uninsureds, there are no statistically significant harmful effects.

VI. CONCLUSION

Do crowd-out prevention measures cause SCHIP to create new uninsured children? There is quite an extensive literature that evaluates whether crowd-out exists in public programs (particularly in healthcare programs) and the effectiveness of measures designed to prevent it. However, little to no research has been done on whether there are possible secondary effects of these preventive measures.

In their design of SCHIP many states attempted to prevent crowd-out by implementing a mandatory wait period which stated that a child had to be without private health insurance for a certain length of time before she could switch from private to public health insurance. Our model shows that potentially some of these mandatory wait period are short enough to not

impose a great enough risk to prevent a parent from taking her child out of private health insurance and enrolling her in SCHIP. Since the benefit of enrolling a child in SCHIP decreases as the length of the no coverage period grows, it is likely that there is a long enough period such that parents will not crowd-out.

After going through the dynamics of a crowd-out model, we empirically test it. Using the SIPP, we observe the post-SCHIP insurance behavior of individuals who had private health insurance during the six months prior to the implementation of SCHIP in their state of residence. We find that SCHIP eligible residents of states in which there are shorter uncovered periods are more likely to be uninsured for one or more months during the six months following the implementation of SCHIP in their state. However, as our model suggested, as the uncovered period gets longer this likelihood does eventually decrease. Thus, there are uncovered periods that successfully reduce crowd-out and therefore will not create new uninsured children. Of the observed uncovered periods, twelve months seem to create enough risk to discourage eligibles from crowding-out.

These findings show that policy makers who designed these crowd-out measures had the right idea. However, the success of the mandatory wait period depends strongly on the magnitude of the program. This research demonstrates that partial implementation of a measure not only prevents the full desired return of that measure, but may also lead to other adverse results.

While the shorter uncovered periods result in new uninsured children, there are no negative health effects. Eligible, previously insured children in states with shorter uncovered periods are

less likely to visit a doctor's office following SCHIP implementation, but there is no difference in their occurrences of hospital stays or any additional deterioration of health status after one year. However, not observing fewer hospital stays raises the question of the financial consequences for the hospitals and insured patients that likely subsidize these stays.

While these finding are strongly suggestive, the data prevents us from definitively stating that the uninsurance we observe is entirely related to enrollment in SCHIP. Unfortunately, enrollment in SCHIP was not captured in the 1996 SIPP cohort. The SIPP survey does ask about enrollment in public health insurance programs, but since many states created separate SCHIP programs that imitated private health insurance the distinction may not have been clear for many parents who were surveyed. Since it was important to capture insurance behavior prior to SCHIP's existence, we are only able to observe who becomes uninsured after its implementation and assume that those uninsured who are eligible eventually enroll in SCHIP.

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TABLE 1
Crowd-Out Prevention of SCHIP Programs by State

State	Length of Retroactive Period	Length of Mandatory Wait Period	Uncovered Months
Alabama	3	0	0
Arizona	0	6	6
Arkansas	3	6	3
Colorado	1	3	2
Connecticut	3	0	0
Florida (SCHIP)	0	0	0
Florida (Medicaid Exp)	3	0	0
Georgia	1	3	2
Illinois	3	0	0
Iowa	3	0	0
Kansas	0	6	6
Maryland	3	5	2
Massachusetts	0.333	0	0
Michigan	0	6	6
Missouri	0	6	6
New Jersey	0	12	12
New York	0	0	0
North Carolina	0	6	6
Ohio	3	0	0
Oklahoma	3	0	0
Oregon	3	6	3
Pennsylvania	0	0	0
South Carolina	3	0	0
Utah	0	3	3
Virginia	0	12	12

TABLE 2
Variables & Definitions

Variable	Description
Dependent Variables	
NO INSURANCE	Dummy variable equal to 1 if the child is reported to not have insurance in at least one of the six months following SCHIP implementation
DOCTOR'S VISIT	Dummy variable equal to 1 if at least one doctor's visit occurred during the year following SCHIP implementation
HOSPITAL STAY	Dummy variable equal to 1 if at least one hospital stay occurred during the year following SCHIP implementation
DETERIORATING HEALTH	Dummy variable equal to 1 if reported health is worse at one year after the SCHIP implementation than at SCHIP implementation
Program Characteristics	
UNCOVERED MONTHS	Difference in the number of months in mandatory wait period and months of retroactive coverage
UNCOVERED PERIOD?	Dummy variable equal to 1 if $\text{UNCOVERED MONTHS} > 0$
X MONTHS OF NO COVERAGE	Dummy variable equal to 1 if $\text{UNCOVERED MONTHS} = X \in \{2,3,6,12\}$
SCHIP CO-PAY ($10)	Expected annual co-pay for services based upon national average utilization of child health care services
SCHIP PREMIUM ($10)	Monthly premium if family enrolls in SCHIP based on family income and number of children in the family
MEDICAID EXPANSION	Dummy variable equal to 1 if state has an SCHIP program that is an expansion of Medicaid
PRIVATE PREMIUM ($10)	Average employee contribution for employer health insurance in state
CHANGE IN PRIVATE PREMIUM	Percentage growth in PRIVATE PREMIUM from six months prior to six months after SCHIP

TABLE 2 (cont'd)
Variables & Definitions

Variable	Description
Personal and Family Characteristics	
ELIGIBLE	Dummy variable equal to 1 if child is eligible for SCHIP based on family income
INCOME ($1000)	Family's monthly income
NUMBER OF CHILDREN	Number of children in family who are eligible for SCHIP
AGE	Age of child at SCHIP implementation date
BAD HEALTH	Dummy variable equal to 1 if child's self-reported health is fair or poor at SCHIP implementation date
BLACK	Dummy variable equal to 1 if child is Black
AMERICAN INDIAN	Dummy variable equal to 1 if child is American Indian, Aleutian, or Eskimo
ASIAN	Dummy variable equal to 1 if child is Asian or a Pacific Islander
MOM/DAD CHANGED JOB	Dummy variable equal to 1 if mom/dad changed jobs between six months before and after SCHIP
MOM/DAD EDUCHS	Dummy variable equal to 1 if mom/dad's highest level of education is a high school diploma
MOM/DAD EDUCSOMECOLL	Dummy variable equal to 1 if mom/dad's highest level of education is some college
MOM/DAD EDUCCOLL	Dummy variable equal to 1 if mom/dad's highest level of education is a college degree
MOM/DAD EDUCPOSTGRAD	Dummy variable equal to 1 if mom/dad's highest level of education is post-baccalaureate
MOM/DAD PAID JOB	Dummy variable equal to 1 if mom/dad has a paid job at SCHIP implementation date
PARENT JOBGT100	Dummy variable equal to 1 if either parent is employed at a firm with at least 100 employees (at all locations) at SCHIP implementation date

TABLE 3
Descriptive Statistics for the Sample by Eligibility and Length of Mandatory Wait Period

	Non-Eligible Children	Near-Eligible Children	All Eligible Children
No Insurance?	0.026 (0.1600)	0.047 (0.2120)	0.07 (0.2560)
Doctor's Visit?	0.772 (0.42)	0.736 (-0.441)	0.688 (-0.464)
Hospital Stay?	0.039 (0.195)	0.039 (0.193)	0.038 (0.191)
Deteriorating Health?	0.194 (0.396)	0.201 (0.401)	0.249 (0.433)
SCHIP Co-Pay ($10)	0.899 (1.424)	0.896 (1.473)	0.936 (1.493)
SCHIP Premium ($10)	0.589 (1.216)	0.686 (1.437)	0.598 (1.202)
Medicaid Expansion Program?	0.606 (0.489)	0.554 (0.497)	0.528 (0.499)
Private Premium	136.89 (20.34)	136.33 (20.66)	137.46 (20.14)
Monthly Income ($1000)	5.89 (4.515)	3.144 (1.501)	2.47 (1.74)
Number of Children	2.102 (0.873)	2.284 (0.969)	2.624 (1.23)
Age	9.659 (5.319)	9.785 (5.221)	11.096 (4.937)
Bad Health?	0.012 (0.111)	0.014 (0.118)	0.024 (0.153)
N	5223	1064	1681

Note: Standard deviations in parenthesis

TABLE 3 (cont'd)
Descriptive Statistics for the Sample by Eligibility and Length of Mandatory Wait Period

	Children Eligible for SCHIP					
		Uncovered Months				
	All	0	2	3	6	12
No Insurance?	0.0700 (0.2560)	0.068 (0.2520)	0.122 (0.3280)	0.073 (0.2620)	0.079 (0.2700)	0.008 (0.0900)
Doctor's Visit?	0.688 (0.464)	0.734 (0.442)	0.598 (0.493)	0.58 (0.495)	0.657 (0.475)	0.667 (0.473)
Hospital Stay?	0.038 (0.191)	0.032 (0.175)	0.047 (0.212)	0.013 (0.115)	0.053 (0.224)	0.057 (0.233)
Deteriorating Health?	0.249 (0.433)	0.237 (0.425)	0.264 (0.444)	0.252 (0.436)	0.267 (0.443)	0.261 (0.441)
SCHIP Co-Pay ($10)	0.936 (1.493)	0.577 (0.893)	0.885 (1.427)	2.821 (2.466)	0.903 (1.527)	1.376 (1.511)
SCHIP Premium ($10)	0.598 (1.202)	0.518 (0.991)	1.364 (0.898)	0.000 (0.000)	0.773 (1.747)	0.646 (0.746)
Medicaid Expansion Program?	0.528 (0.499)	0.535 (0.499)	0.000 (0.000)	0.573 (-0.496)	0.636 (-0.482)	0.512 (-0.502)
Private Premium	137.46 (20.14)	136.89 (22.7)	150.28 (9.23)	133.46 (18.59)	131.14 (14.06)	156.67 (3.17)
Monthly Income ($1000)	2.47 (1.74)	2.263 (1.455)	2.705 (1.312)	2.215 (1.377)	2.883 (2.403)	2.656 (1.352)
Number of Children	2.624 (1.23)	2.592 (1.222)	2.673 (1.147)	2.607 (1.39)	2.741 (1.26)	2.439 (1.017)
Age	11.096 (4.937)	11.6 (4.797)	10.122 (4.891)	9.253 (5.325)	11.084 (4.863)	10.618 (5.102)
Bad Health?	0.024 (0.153)	0.027 (0.163)	0.037 (0.191)	0.033 (0.18)	0.017 (0.129)	0.000 (0.000)
N	1681	884	107	150	417	123

Note: Standard deviations in parenthesis

TABLE 4
Probit Estimates of the Effect of Mandatory Wait Periods on Uninsured Status of SCHIP Eligibles

	I	II	III
Eligible	-0.1316	-0.2014	-0.1858
	(0.1492)	(0.1852)	(0.1810)
Uncovered Period?	0.0206		
	(0.0242)		
Uncovered Months		0.0175**	
		(0.0083)	
Uncovered Months^2		-0.0021***	
		(0.0008)	
2 Months of No Coverage			0.0696
			(0.0992)
3 Months of No Coverage			0.0423
			(0.0580)
6 Months of No Coverage			0.0323
			(0.0346)
12 Months of No Coverage			-0.0422*
			(0.0084)
SCHIP Deductible ($10)	-0.0030	-0.0046	0.0038
	(0.0077)	(0.0071)	(0.0075)
SCHIP Premium ($10)	0.0088	0.0073	0.0067
	(0.0091)	(0.0083)	(0.0088)
Medicaid Expansion	-0.0468***	-0.0465***	-0.0445***
	(0.0152)	(0.0144)	(0.0149)
Private Premium ($10)	-0.0001	0.0007	-0.0001
	(0.0005)	(0.0006)	(0.0005)
Change in Private Premium	0.0183	0.0179	0.0221
	(0.0836)	(0.0808)	(0.0806)
Income ($1000)	-0.0108	-0.0099	-0.0097
	(0.0091)	(0.0083)	(0.0084)
Number of Children	0.0410*	0.0374	0.0363
	(0.0243)	(0.0229)	(0.0230)
Number of Children^2	-0.0054	-0.0050	-0.0048
	(0.0037)	(0.0035)	(0.0035)
Age	0.0040***	0.0040***	0.0038***
	(0.0015)	(0.0014)	(0.0014)
Bad Health	-0.0432**	-0.0408**	-0.0406**
	(0.0066)	(0.0061)	(0.0061)
N	2745	2745	2745

Note: Standard errors robust to clustering within families in parenthesis.
* $\rho < 0.10$ ** $\rho < 0.05$ *** $\rho < 0.01$

TABLE 5
Ordered Probit Estimates of the Effect of Mandatory Wait Periods on Number of Periods of No Insurance

	I	II(1 period)	III(2 periods)	IV(3 periods)
Eligible	2.1871 (2.1609)	-0.1169 (0.1484)	0.1159 (0.1460)	0.0010 (0.0027)
Mandatory Wait Months	1.2480* (0.6429)	-0.0774* (0.0438)	0.0771* (0.0436)	0.0003 (0.0005)
Mandatory Wait Months^2	-0.1933** (0.0924)	0.0120* (0.0065)	-0.0119* (0.0065)	-0.0001 (0.0001)
Income ($1000)	-1.0888*** (0.3454)			
Number of Children	1.3063 (1.8472)			
Number of Children^2	-0.2596 (0.3680)			
Age	-0.0794 (0.0938)			
Bad Health^	-7.3899*** (0.7950)			

Note: Standard errors robust to clustering within families in parenthesis.
* $\rho < 0.10$ ** $\rho < 0.05$ *** $\rho < 0.01$

TABLE 6
Probit Estimates of the Effect of Mandatory Wait Periods on Health Care

	Doctor's Visits	Hospital Stays	Deteriorating Health
Eligible	0.1352 (0.2290)	-0.0036 (0.0550)	0.1930 (0.1905)
Uncovered Months	-0.0320* (0.0183)	0.0012 (0.0048)	-0.0183 (0.0190)
Uncovered Months^2	0.0028* (0.0017)	0.0001 (0.0004)	0.0017 (0.0017)
SCHIP Deductible ($10)	-0.0170 (0.0168)	-0.0032 (0.0052)	0.0320* (0.0175)
SCHIP Premium ($10)	0.0044 (0.0184)	0.0029 (0.0061)	0.0044 (0.0171)
Medicaid Expansion	0.0521 (0.0454)	-0.0167 (0.0100)	-0.0611 (0.0447)
Private Premium ($10)	-0.0016 (0.0010)	-0.0001 (0.0003)	-0.0002 (0.0014)
Change in Private Premium	0.0186 (0.2009)	-0.0364 (0.0474)	-0.0555 (0.2050)
Income ($1000)	-0.0164 (0.0159)	0.0010 (0.0035)	-0.0476*** (0.0188)
Number of Children	0.0152 (0.0701)	0.0032 (0.0167)	0.0784 (0.0681)
Number of Children^2	-0.0006 (0.0119)	-0.0012 (0.0025)	-0.0136 (0.0114)
Age	-0.0050 (0.0038)	0.0032** (0.0013)	-0.0066* (0.0040)
Bad Health	-0.7502*** (0.0102)	0.0214 (0.0443)	

Note: Standard errors robust to clustering within families in parenthesis.
* $\rho < 0.10$ ** $\rho < 0.05$ *** $\rho < 0.01$

Appendix A: Partial Effects of Variables in the Model

Health Stock:

$$\frac{\partial \Delta U}{\partial H} = \sum_{t=1}^{L} \frac{\frac{\partial \pi}{\partial H}\left\{\ln\left[\frac{Y-C}{Y-P_P-D_P}\right]-\ln\left[\frac{Y}{Y-P_P}\right]\right\}}{(1+r)^{t-1}} + \sum_{t=L+1}^{228-a} \frac{\frac{\partial \pi}{\partial H}\left\{\ln\left[\frac{Y-P_S-D_S}{Y-P_P-D_P}\right]-\ln\left[\frac{Y-P_S}{Y-P_P}\right]\right\}}{(1+r)^{t}} \quad \text{(Eq. A1)}$$

As health stock increases there is a decrease in the likelihood that the child will become sick. During the no-coverage period the family is less likely to face the full cost of healthcare and thus will experience a marginal utility gain. In the post-no-coverage period the family is always better off having SCHIP versus private health insurance. When health stock increases, the family experiences a loss in utility since the gain in utility from having SCHIP is greater when the child is sick.

Even though there are more periods in the post-no-coverage period, it is still likely that the overall marginal effect of health stock is positive since the post-no-coverage period is discounted more heavily than the no-coverage period. Also, the utility loss from having no health insurance versus private when sick is expected to be much greater than the utility advantage of having SCHIP (versus private).

Private Insurance Premium:

$$\frac{\partial \Delta U}{\partial P_P} = \sum_{t=1}^{228-a} \frac{\left\{ \frac{\pi(H)}{Y - P_P - D_P} + \frac{[1-\pi(H)]}{Y - P_P} \right\}}{(1+r)^{t-1}} > 0 \qquad \text{(Eq. A2)}$$

An increase in the price of the private premium increases the utility advantage of SCHIP. The increased premium creates a larger difference between the quantity of private good that can be purchased when enrolling in SCHIP versus private insurance (the difference decreases for a SCHIP family of a child who is sick during the no-coverage period).

Private Insurance Deductible:

$$\frac{\partial \Delta U}{\partial D_P} = \sum_{t=1}^{228-a} \frac{\left[\frac{\pi(H)}{Y - P_P - D_P} \right]}{(1+r)^{t-1}} > 0 \qquad \text{(Eq. A3)}$$

Similar to an increase in the private insurance premium, an increase in the private insurance deductible will also increase the advantage of SCHIP over private insurance since the difference in the amount of private good purchased will increase – but only in those periods where the deductible is relevant (i.e. when the child is sick).

SCHIP Premium:

$$\frac{\partial \Delta U}{\partial P_S} = \sum_{t=L+1}^{228-a} \frac{\left\{ \frac{[\pi(H)-1]}{Y - P_S} - \frac{\pi(H)}{Y - P_S - D_S} \right\}}{(1+r)^{t-1}} < 0 \qquad \text{(Eq. A4)}$$

SCHIP Deductible:

$$\frac{\partial \Delta U}{\partial D_S} = \sum_{t=L+1}^{228-a} \frac{\left[\frac{-\pi(H)}{Y - P_s - D_S}\right]}{(1+r)^{t-1}} < 0 \qquad \text{(Eq. A5)}$$

From equations (A4) and (A5) we see that the effect of an increase in the premium and deductible of SCHIP has the opposite sign of an increase of their private insurance counterparts. Intuitively, this makes sense because an increase in either will decrease the difference between the private good consumed by SCHIP and private insurance families.

Age:

Calculating the marginal effect of age simply requires arithmetic. We only need to difference the utility advantage of a family with a child with age *a* and a family with a child with age *a+1*. The difference will reflect the fact that the family with the older child will receive one less period of utility advantage. The period's forgone utility is shown in equation (A6).

$$a \uparrow \rightarrow \Delta(\Delta U) = -\frac{\left\{\pi(H)\ln\left[\frac{Y - P_S - D_S}{Y - P_P - D_P}\right] + [1 - \pi(H)]\ln\left[\frac{Y - P_S}{Y - P_P}\right]\right\}}{(1+r)^{227-a}} < 0 \quad \text{(Eq. A6)}$$

Since the family of the older child (all else equal) has the identical flow of utility advantages over time (except during period *228-a*) as the family of the younger child, the older family will have a lower utility advantage (assuming that the age of the child is such that she will reach the maximum age for SCHIP after the no coverage period ends). Thus, the marginal effect of age is negative. Due to age's effect on the discount rate it can be surmised that the marginal effect of age is decreasing.

Income:

$$\frac{\partial \Delta U}{\partial Y} = \sum_{t=1}^{L} \frac{\left\{ \pi(H) \frac{C - P_P - D_P}{(Y - P_P - D_P)[Y - C]} + [1 - \pi(H)] \frac{-P_P}{(Y - P_P)Y} \right\}}{(1+r)^{t-1}} + \sum_{t=L+1}^{228-a} \frac{\left\{ \pi(H) \frac{[(P_S + D_S) - (P_P + D_P)]}{(Y - P_P - D_P)(Y - P_S - D_S)} + [1 - \pi(H)] \frac{P_S - P_P}{(Y - P_P)(Y - P_S)} \right\}}{(1+r)^{t-1}} \quad \text{(Eq. A7)}$$

As income increases the marginal effect of an additional dollar of the private good decreases. Thus, in the states where crowding-out means additional private good consumption, the families with higher incomes will gain less utility from crowding-out. However, when the child is sick in the no-coverage period (the only state in which crowding-out leads to less private good consumption) the higher income family values the marginal private good less, and thus has less utility loss. From equation (A7) the sign of the no-coverage term is ambiguous (the smaller the likelihood of sickness, the more likely it is negative), while the post-no-coverage period's term is negative. Thus, an

increase in income is more likely to result in a marginal decrease in utility when the child is less likely to get sick..

Appendix B: SIPP

We encountered some problems when measuring a child's family income and determining if a particular income level allowed a child to enroll in SCHIP. States set the eligibility ranges for their SCHIP programs in terms of the Federal Poverty Level (FPL). During the time studied, the FPL was published in the Federal Register and changed on an annual basis, either in February or March. It is unclear how quickly a state incorporated the new FPL into their eligibility process. We assumed state's made the changes as soon as new FPL guidelines were published. Even if states did not update their FPL this quickly, it should have minimal impact on our results since the FPL increased by only a small amount every year. A related problem was FPL figures were in terms of annual income. Annual income did not exist for some observations in the sample. For those observations, we used income information for a six month or three month period. To determine those incomes as a percentage of FPL, the yearly FPL figures were divided by 2 and 4 respectively. Related to this, each state allowed families to deduct certain expenses from the income they reported to determine eligibility. These deductions usually included: a small portion of earnings (usually $90), child care expenses, alimony payments paid and received, child support payments paid and received, medical care expenses, and gifts received. These deductions varied by state. SIPP provided incomplete information regarding the amount observations spent or received in these categories making it difficult to determine what a family's countable income was.

Therefore, we did not account for any of these deductions. Thus, we underestimate eligibility.

APPENDIX TABLE 1
Probit Estimates of the Effect of Mandatory Wait Periods on Uninsured Status of SCHIP Eligibles (includes those not eligible for SCHIP)

	I	II	III
Eligible	-0.0245	-0.0349	-0.0334
	(-0.0262)	(-0.0216)	(-0.0218)
Uncovered Period?	0.0063		
	(-0.0119)		
Uncovered Months		0.0086**	
		(-0.004)	
Uncovered Months^2		-0.0011****	
		(-0.0004)	
2 Months of No Coverage			0.0358
			(-0.0461)
3 Months of No Coverage			-0.0029
			(-0.0167)
6 Months of No Coverage			0.0185
			(-0.0181)
12 Months of No Coverage			-0.0241**
			(-0.0033)
SCHIP Deductible ($10)	0.0013	0.0002	0.0016
	(-0.0034)	(-0.0032)	(-0.0036)
SCHIP Premium ($10)	0.0037	0.0032	0.0012
	(-0.0051)	(-0.0049)	(-0.0053)
Medicaid Expansion	-0.0190***	-0.0191***	-0.0175**
	(-0.0053)	(-0.005)	(-0.0054)
Private Premium ($10)	0.0001	0.0003	0.0003
	(-0.0002)	(-0.0002)	(-0.0002)
Change in Private Premium	0.0199	0.0189	0.0129
	(-0.0428)	(-0.0406)	(-0.0409)
Income ($1000)	-0.0079**	-0.0077**	-0.0076**
	(-0.0037)	(-0.0036)	(-0.0036)
Number of Children	0.0196	0.0188	0.0191
	(-0.0135)	(-0.0131)	(-0.0132)
Number of Children^2	-0.0023	-0.0022	-0.0023
	(-0.0023)	(-0.0023)	(-0.0023)
Age	0.0017**	0.0018**	0.0017**
	(-0.0008)	(-0.0008)	(-0.0008)
Bad Health	-0.0226*	-0.0223**	-0.0221**
	(-0.0044)	(-0.0039)	(-0.0039)
N	6904	6904	6904

Note: Standard errors robust to clustering within families in parenthesis.
* $\rho < 0.10$ ** $\rho < 0.05$ *** $\rho < 0.01$

APPENDIX TABLE 2
Mean Premium and Deductibles Faced by SCHIP Eligibles

	Premium	Deductible
Uncovered Period = 0	$5.18	$5.77
Uncovered Period > 0	$6.87	$13.34