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SIMULATION METHODS IN HEALTH SERVICES RESEARCH: APPLICATIONS FOR POLICY, MANAGEMENT, AND PRACTICE

Income Eligibility Thresholds, Premium Contributions, and Children's Coverage Outcomes: A Study of CHIP Expansions

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Objective. To understand the effects of Children's Health Insurance Program (CHIP) income eligibility thresholds and premium contribution requirements on health insurance coverage outcomes among children.

Data Sources. 2002–2009 Annual Social and Economic Supplements of the Current Population Survey linked to data from multiple secondary data sources.

Study Design. We use a selection correction model to simultaneously estimate program eligibility and coverage outcomes conditional upon eligibility. We simulate the effects of three premium schedules representing a range of generosity levels and the effects of income eligibility thresholds ranging from 200 to 400 percent of the federal poverty line.

Principal Findings. Premium contribution requirements decrease enrollment in public coverage and increase enrollment in private coverage, with larger effects for greater contribution levels. Our simulation results suggest minimal changes in coverage outcomes from eligibility expansions to higher income families under premium schedules that require more than a modest contribution (medium or high schedules).

Conclusions. Our simulation results are useful counterpoints to previous research that has estimated the average effect of program expansions as they were implemented without disentangling the effects of premiums or other program features. The sensitivity to premiums observed suggests that although contribution requirements may be effective in reducing crowd-out, they also have the potential, depending on the level of contribution required, to nullify the effects of CHIP expansions entirely. The persistence of uninsurance among children under the range of simulated scenarios points to the importance of Affordable Care Act provisions designed to make the process of obtaining coverage transparent and navigable.

Key Words. CHIP, public insurance, expansions, premium, simulation

Movement toward universal coverage of children is a defining feature of Children's Health Insurance Program (CHIP) changes during the last decade. In the years leading up to the passage of the Patient Protection and Affordable Care Act (ACA) in March 2010, many states began implementing far more inclusionary CHIP programs, extending eligibility to children in families with incomes far higher than historical eligibility thresholds. Between 2002 and 2009, 13 states boosted their income eligibility threshold for CHIP to between 200 and 400 percent of the federal poverty line (FPL).

Such changes have not occurred without controversy. A touchstone has been concern about the potential for and magnitude of "crowd-out"—a decrease in private insurance coverage in response to the increased availability of public coverage. Both to reduce the potential for crowd-out and as a means to ensure the financial viability of their expanded CHIP programs, most expansion states began requiring newly eligible higher income families to contribute to the premium costs of coverage. Premium contribution requirements in 2008 among states that offered coverage to families with incomes at least three times FPL ranged from \$240 to more than \$1,000 per year for a family with two children.¹ States also implemented other precautionary measures designed to reduce crowd-out, such as waiting periods between loss of private coverage and public eligibility.

A number of studies using a variety of analytic approaches, including instrumental variables (IV) estimation as well as difference-in-difference approaches, have explored the effects on coverage outcomes of public health insurance expansions, including the Medicaid expansions of the late 1980s (e.g., Cutler and Gruber 1996; Ham and Shore-Sheppard 2005; Shore-Sheppard 2008), the introduction of CHIP in 1996 (LoSasso and Buchmueller 2004; Hudson, Selden, and Banthin 2005; Bansak and Raphael 2006; Sommers et al. 2007; Gruber and Simon 2008; Dubay and Kenney 2009), and the CHIP expansions of the 2002–2009 period (Gresenz et al. 2012). A few studies have examined the effects of premium contribution requirements for

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CHIP on coverage outcomes for children. Using data from before 2003, Hadley et al. (2006/2007) and Kenney, Hadley, and Blavin (2006/2007) estimate the effects of premium contributions on coverage outcomes for children in families with incomes less than 300 percent of the FPL who are eligible for public insurance. Both studies find that premium contribution requirements reduce enrollment in public insurance programs, with offsetting increases in uninsurance and private insurance. However, to our knowledge, no study has explored the effects of premium contributions associated with more recent CHIP expansions to higher income children. Moreover, little is known about the interplay between income eligibility thresholds and premium contribution requirements in determining coverage outcomes, especially among higher income children.

This study uses simulation techniques to understand the effects of CHIP income eligibility thresholds and premium contribution requirements on health insurance coverage outcomes among children targeted by recent CHIP expansions, which include children in families with incomes up to 400 percent of the FPL. Specifically, we examine the effects of various income eligibility threshold and premium contribution combinations on take-up of public coverage, private coverage, and overall insurance coverage rates. Our analyses are based on data from 2002 to 2009, a period during which 18 states expanded eligibility for CHIP.

METHODS

Data and Study Sample

Our main sources of data are the 2002–2009 Annual Social and Economic Supplements (ASEC) of the Current Population Survey (CPS). The CPS-ASEC, which is administered each February–April by the U.S. Census Bureau, collects labor market, sociodemographic, and health insurance data from samples of households that are representative of each state. The health insurance questions enable researchers to classify children's coverage as public (Medicaid or CHIP), private (group or nongroup), or none, and subjects are allowed to report both public and private coverage. The study sample consists of children younger than 18 who were in families with incomes below 400 percent of the FPL.

We compile data from various sources to characterize states' CHIP programs along a number of domains, including income eligibility thresholds, income disregards, other eligibility criteria, whether CHIP is integrated with

the state's Medicaid program or is a separate program, and whether the state has a waiver that allows for parental eligibility (Bissell and Allen 2001; Kaiser Commission on Medicaid and the Uninsured 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009a,b; The Urban Institute 2010).

We obtain state-level estimates of unemployment rates, poverty rates among children, unionization rates, and per capita income from CPS data and merge these variables to individual observations. We also obtain information on the proportion of employees who are offered employer-sponsored insurance and the employee share of private insurance premiums for family coverage by firm size for each state and year from summary tables from the Medical Expenditure Panel Survey-Insurance Component (MEPS-IC). We use these data to calculate a measure of the price of private insurance.²

Modeling, Estimation, and Simulation

Overview of Modeling Approach. To simulate the effects of premium contribution requirements and income eligibility thresholds on coverage outcomes among children, we first develop and estimate a model of how such factors affect outcomes. A general model can be written as follows:

$$V_{ijt} = f(\mathbf{X}_{it}, \mathbf{Z}_{jt}, \mathbf{Q}_{ijt}) \quad (1)$$

where $\mathbf{V}_{ijt}$ represents a health insurance coverage outcome for individual i in location j at time t ; $\mathbf{X}_{it}$ are characteristics of the child and his/her family; $\mathbf{Z}_{jt}$ are characteristics of location j ; and $\mathbf{Q}_{ijt}$ includes characteristics of the public health insurance program that vary by state (j) and year (t), such as income eligibility thresholds and other eligibility criteria, as well as program features that also vary across children (i) depending on their income level or other characteristics, including the premium contribution requirement and waiting period.

A reduced form approach to model estimation would be to use a sample of all children in the population of interest (those in families with incomes up to 400 percent of the FPL) and include various program features as independent variables. However, public program characteristics such as premium contribution requirements and waiting periods apply only to eligible children, and thus are measureable only for these children. Therefore, our approach is to estimate a multipart model that includes (1) a model for eligibility status (eligible vs. ineligible) and (2) models for coverage outcomes conditional upon eligibility status. A general formulation is as follows:

$$E(V_{ijt}) = P(E_{ijt} = 1) * (P(V_{ijt})|E_{ijt} = 1)) + P(E_{ijt} = 0) * (P(V_{ijt})|E_{ijt} = 0)) \quad (2)$$

where E_{ijt} is a dichotomous indicator of a child's eligibility for public insurance. A straightforward approach to estimating $(P(V_{ijt})|E_{ijt} = 1)$ and $(P(V_{ijt})|E_{ijt} = 0)$ in equation 2 is to estimate models that explicitly condition on eligibility status; that is, one set of models is estimated using the sample of eligible children and another uses the sample of ineligible children. Because families have some ability to modify their income to meet an eligibility threshold through job choice or hours worked, however, eligibility may be endogenous. Consequently, we use a selection correction model to simultaneously estimate a child's probability of eligibility and health insurance coverage outcomes (Heckman 1979). Eligibility is the dependent variable in the selection equation; coverage outcomes are the dependent variables in the main equations.

Selection Equation. Eligibility is not directly observed in our data; rather, we impute a dichotomous variable indicating eligibility of each child using information on states' eligibility requirements in each year along with information on children's sociodemographic characteristics from the CPS-ASEC. The general form of the selection equation is as follows:

$$E_{ijt} = f(\mathbf{X}_{it}, \mathbf{Z}_{jt}, I_{jt}) \quad (3)$$

where E_{ijt} is a dichotomous indicator for (imputed) eligibility of the child, $\mathbf{X}_{it}$ and $\mathbf{Z}_{jt}$ are as defined in equation 1, and I_{jt} represents the percentage of a national random sample of children in a particular age group in a particular year who would have been eligible for public insurance in the state and year of interest under the rules in place in that state at that time. This variable serves as an instrument to identify the model and is derived using a national sample of 1,000 children from each age group and year. Conceptually, this constructed instrument captures the net effect of eligibility rules on the probability that a particular child is eligible, but it is not expected to be correlated with coverage outcomes for a child conditional on eligibility, which is crucial for identification. Similar variables have been used in previous studies as instruments for eligibility in different types of analyses (e.g., Cutler and Gruber 1996; Lo-Sasso and Buchmueller 2004; Gruber and Simon 2008).

In the selection equation, the control variables in $\mathbf{X}_{it}$ and $\mathbf{Z}_{jt}$ include variables that affect eligibility: number of children in the family, whether the child was born in the United States, and how many years the child has lived in the United States, nativity of the child's parents, whether the family

is a two-parent family, whether a parent works part time, and state- and year-fixed effects.

Main Equations. We estimate three selection correction regression models—one for each of three health insurance coverage outcomes—for each arm (eligibles and ineligibles) of the model, for a total of six models. The three outcome measures are whether the child had any public insurance during the year, whether the child had any private insurance during the year, and whether the child had no insurance coverage during the year. (In each case, the selection equation is the same.) In theory, ineligible children should not be observed to be enrolled in public insurance; empirically, however, because eligibility is imputed and/or because coverage is self-reported, we observe some ineligible children with public insurance.³ In our simulations, we perform sensitivity analyses, with and without correcting for this anomaly, as described later.

The specification for our main equations includes controls for a comprehensive set of individual and family characteristics, including the age, race, and gender of the child; the size of the family and household structure; parental assessment of the child's health (on a 1–5 scale); highest level of education for either parent; a set of indicators for whether the child is foreign born or his/her parent is foreign born and length of time the child has been in the United States; and family income as a percentage of the poverty line. We include a set of variables describing parental employment to capture differences across families in the probability of having an insurance offer from an employer (as information about offers is not elicited in the CPS). Thus, we include indicators for whether any parent is employed full time, employed part time, employed in the public sector, or is self-employed. For those employed full time in the private sector, we also include indicators for category of occupation of the parent (where we choose the parent with the occupation that is most likely to provide an offer of insurance) and for the firm size of the parent in the largest firm.

We also include selected time varying characteristics of each state to control for their potential direct effect on insurance coverage outcomes and relationship with policy changes affecting eligibility in each state. These include measures of current and lagged unemployment, per capita income, the percentage of children age 0–5 in each state who live in poverty, the percentage of children age 6–18 in each state living in poverty, the percentage of employed individuals in the state who are unionized, and a measure of the price of private insurance (see above).

In the eligible arm of the model only, we include features of states' CHIP programs that are likely to influence the attractiveness of public coverage relative to other coverage outcomes among potential enrollees. First, we include indicator variables for whether the annual premium for public insurance is low (<\$361), medium (\$361–\$720), or high (>\$720), with a reference group of no premium contribution requirement.⁴ Premium values are specific to state, year, and income level of the family. We also include a set of variables indicating whether the state requires no waiting period (reference), a 1- to 3-month waiting period, or a 4- or more month waiting period. In addition, we control for whether the CHIP program is a Medicaid expansion or separate program and whether the state has in place a waiver that allows parents of children eligible for CHIP to themselves be eligible for CHIP.

In both arms, we include state- and year-fixed effects. The state-fixed effects capture time-invariant state characteristics. Furthermore, by including state-fixed effects, we ensure that our estimates are identified from changes over time in income eligibility thresholds (i.e., by the eligibility expansions), and not by cross-sectional differences in eligibility across states.

Estimation. We estimate maximum likelihood probit models with selection using the “heckprob” routine in Stata. Estimates are weighted and standard errors are adjusted for weighting and clustering to reflect the complex design of the CPS, as recommended by Davern and colleagues (2007).

Simulations. We use the model estimates to simulate the effects of low-, medium-, and high-income eligibility thresholds, respectively, set at 200, 300, and 400 percent of the FPL. In addition, we simulate the effects of three alternative premium schedules representing a range of generosity levels, with each schedule based on a set of premia observed in a particular state (Vermont, Washington, Illinois) that expanded its CHIP program during the period of our study. Premium schedules vary in both the income level at which contribution requirements begin and the level of the contribution required at each income level (Table 1).⁵

Our simulations vary only premium contributions and income eligibility thresholds. We fix other program characteristics, such as waiting periods and income disregards, at typical values.⁶ We retain the actual values of all other variables. Thus, the simulations can be thought of as representing what coverage outcomes would look like among children nationally under a

Table 1: Simulated Premium Schedules

	<i>Premium Schedule</i>		
	<i>Low</i>	<i>Medium</i>	<i>High</i>
Income level (% FPL) at which contribution requirements begin	186%	200%	151%
Premium contribution by income level			
185% FPL	\$0	\$0	\$300
200% FPL	180	480	960
250% FPL	240	480	960
300% FPL	240	720	1,680
350% FPL	320	720	1,680

Note. Low, medium, and high premium schedules developed using schedules in Vermont, Washington, and Illinois as their basis.

stylized CHIP program implemented uniformly across all states. We use equation (2) to calculate the expected percentages of children with public coverage, private coverage, and no coverage. We estimate the standard errors for the simulated percentages using the delta method.

Sensitivity Analyses. We used a variety of alternative dollar values for defining low, medium, and high premium contribution requirements, and we used a variety of parameterizations of waiting periods, including an indicator for any versus no waiting period and a continuous measure of the number of months of the waiting period. We tested models that included either indicators for program features that affect ease of enrollment (e.g., presumptive eligibility, income verification requirement) or an index derived from the specific indicators. However, our main models exclude these variables because we found that their effects were rarely statistically significant.

As described earlier, because eligibility is imputed and/or because coverage is self-reported, we observe some ineligible children who have public insurance coverage. Therefore, we also conducted sensitivity analyses in which we drop ineligible children who report public insurance, as well as sensitivity analyses in which we randomly assign 5 percent of the children whose family income was close to the income eligibility threshold (on either side) to the opposite eligibility status. As our results were robust to these sensitivity analyses, we report only the results of the main analyses.

RESULTS

Descriptive Statistics

Table 2 provides descriptive statistics for the sample of children (ages 0–17 in families with incomes less than 400 percent of the FPL) in the most recent year (2009). The sample includes 42,806 children in total. About 39 percent are publicly insured, 55 percent have private insurance, and 12 percent are uninsured. An estimated 75 percent of the children are eligible for public insurance in 2009. Among children imputed to be eligible for public insurance, 71 percent face no premium for CHIP, 17 percent face a low premium, 7 percent a medium premium, and 5 percent a high premium (Table 2). More than two thirds of eligible children in the sample have no waiting period for eligibility, whereas 17 and 16 percent have waiting periods of 1–3 or 4 or more months, respectively.

Table 3 summarizes premium contribution requirements in 2009 for families at various income levels across the 50 states and District of Columbia. For families with incomes just above the poverty threshold, 42 states required no premium contribution and 9 required a low contribution. A total of 24 states made children in families with incomes just over twice the poverty threshold eligible for subsidized public coverage. In the four states offering eligibility for subsidized public insurance for families with incomes above 300 percent of the FPL, two required a medium premium contribution and two required a high contribution. Waiting periods, which apply to CHIP enrollees in states with a separate CHIP program and to expansion populations in states with combined Medicaid/CHIP programs, were applied in 31 states (data not shown). Sixteen states had a waiting period of between 1 and 3 months, whereas 15 states had a waiting period of 4 or more months.

Simulation Results

Full results of the multivariate, selection corrected regression models for each of the three coverage outcomes for each of the two arms of the model (eligibles and ineligibles) are provided in appendix tables. In Table 4, we present our simulation results.

The top panel of Table 4 shows that when we use actual values of income eligibility thresholds and premium contribution requirements in our simulations, our results come very close to matching observed eligibility and coverage outcomes. For example, our model predicts that 39.1 percent of children have public coverage; in actuality, 39.2 percent do.

Table 2: Descriptive Statistics

	<i>Mean</i>	<i>SD</i>
Health insurance coverage outcomes		
Public insurance	0.392	(0.488)
Private insurance	0.547	(0.498)
No insurance	0.120	(0.325)
Child and family characteristics		
Child is eligible for public insurance (imputed)	0.751	(0.432)
Child is non-Hispanic white	0.492	(0.500)
Child is non-Hispanic black	0.186	(0.389)
Child is Hispanic	0.267	(0.442)
Child's race is other (nonwhite)	0.056	(0.230)
Child's age (mean)	8.290	(5.238)
Child age 0–2	0.179	(0.383)
Child age 3–5	0.174	(0.379)
Child age 6–12	0.378	(0.485)
Child age 13–17	0.268	(0.443)
Child is male	0.511	(0.500)
Family with 1 child	0.189	(0.391)
Family with 2 children	0.372	(0.483)
Family with 3 children	0.261	(0.439)
Family with 4 children	0.113	(0.316)
Family with 5 or more children	0.065	(0.246)
Reported health of child is good, fair, or poor	0.216	(0.411)
Parent with highest level of education is college graduate	0.219	(0.413)
Parent with highest level of education attended some college	0.324	(0.468)
Parent with highest level of education has high school diploma/GED	0.302	(0.459)
Neither parent is high school graduate	0.156	(0.362)
Child is foreign born, lived in United States ≤ 5 years	0.017	(0.128)
Child is foreign born, lived in United States >5 years	0.022	(0.147)
Child is U.S. born with no U.S. born parent/grandparent	0.168	(0.374)
Child is U.S. born with at least 1 U.S. born parent/grandparent	0.794	(0.405)
Urban residence	0.822	(0.383)
Two-parent family	0.592	(0.492)
Family income $<101\%$ FPL	0.310	(0.463)
Family income $101\text{--}150\%$ FPL	0.156	(0.363)

continued

Table 2 *Continued*

	<i>Mean</i>	<i>SD</i>
Family income 151–200% FPL	0.132	(0.338)
Family income 201–250% FPL	0.122	(0.327)
Family income 251–300% FPL	0.110	(0.313)
Family income 301–350% FPL	0.091	(0.288)
Family income 351–400% FPL	0.079	(0.270)
Characteristics of parental employment		
Public sector employee	0.135	(0.341)
Working part time	0.094	(0.291)
Self-employed	0.050	(0.218)
Firm size of parent employed in largest firm		
Firm size <10	0.078	(0.268)
Firm size 10–24	0.065	(0.247)
Firm size 25–99	0.097	(0.295)
Firm size 100–499	0.092	(0.289)
Firm size 500–999	0.037	(0.189)
Firm size 1000+	0.228	(0.420)
Parental occupation		
Management, professional, etc.	0.167	(0.373)
Production, transport., etc.	0.120	(0.325)
Sales and office	0.132	(0.338)
Construction and maintenance	0.072	(0.259)
Service	0.078	(0.269)
Farming, fishing, forestry	0.006	(0.076)
Unknown occupation	0.022	(0.148)
Neither parent employed	0.119	(0.324)
State characteristics		
Percent unemployed	0.093	(0.019)
Lagged percent unemployed	0.055	(0.010)
Per capita income/100,000	0.267	(0.030)
Percent of children 0–5 in poverty	0.224	(0.047)
Percent of children 6–18 in poverty	0.182	(0.035)
Rate of unionization	0.120	(0.065)
Private insurance premium/10,000 (annual)	0.403	(0.045)
State has parental CHIP eligibility waiver	0.174	(0.379)
State has separate CHIP program	0.865	(0.341)
Public insurance features—eligible individuals only		
Zero premium	0.706	(0.456)
Low premium (\$1–\$360)	0.170	(0.375)
Medium premium (\$361–\$720)	0.074	(0.261)
High premium (>\$720)	0.051	(0.220)
No waiting period	0.675	(0.469)
Waiting period 1–3 months	0.166	(0.372)
Waiting period 4 or more months	0.159	(0.366)

Note. Descriptives shown are for the sample of children from 2009 ($n = 42,806$). Sample includes children ages 0–17 in families with income less than 400% FPL, excluding children with no parent or grandparent in the household.

Table 3: Number of States Requiring Premium Contribution by Family Income Level and Contribution Level (2009)

<i>Family Income as a Percent of the Federal Poverty Level (FPL), %</i>	<i>\$0 Premium</i>	<i>\$1–360 Premium ("Low")</i>	<i>\$361–\$720 Premium ("Medium")</i>	<i>> \$720 Premium ("High")</i>	<i>No Eligibility at This Income Level</i>
101	42	9	0	0	0
151	27	19	2	2	1
201	5	4	9	6	27
251	2	2	6	4	37
301	0	0	2	2	47
351	0	0	1	2	48

The bottom panel of Table 4 presents predicted eligibility and coverage outcomes from simulations using different combinations of premium contribution requirements (no, low, medium, and high schedules) and income eligibility thresholds (200, 300, and 400 percent FPL). The first column shows that as the income eligibility threshold increases—from 200 to 300 to 400 percent FPL—the percentage of children eligible for public coverage also increases, from 68 to 85 to 93 percent, respectively.

Using columns 2–4 in the bottom panel, we can compare predicted coverage outcomes for a given premium level under different income eligibility thresholds. For example, with no premium contribution, 38.2 percent of children are predicted to enroll in public coverage under an income eligibility threshold of 200 percent FPL, compared to 42.6 percent of children under a 400 percent FPL threshold. Likewise, with no premium contribution, the percentage of children with private insurance decreases from 55.2 to 53.0 percent and the percentage of children who are uninsured falls from 13.5 to 12.5 percent under income eligibility thresholds of 200 and 400 percent FPL, respectively. Differences in the point estimates of coverage outcomes for 200 versus 400 percent FPL were far less pronounced under medium and high premium schedules, and testing confirmed that these differences were not statistically significant. Despite the fact that they were considerably larger, differences in estimated coverage outcomes for 200 versus 400 percent FPL under zero and low premium schedules were also not statistically significant, due to the size of the associated standard errors.

Table 4 also shows that as public premium contributions increase for a given income eligibility threshold, the percentage of children who are enrolled

Table 4: Baseline Simulation Results and Results Varying Income Eligibility and Premium Schedules

	<i>Percent of Children Eligible for Public Coverage</i>	<i>Percent of Children with Public Coverage</i>	<i>Percent of Children with Private Coverage</i>	<i>Percent of Children Uninsured</i>
Baseline results				
2009 actual	0.7513	0.3920	0.5469	0.1203
2009 simulated	0.7524	0.3911	0.5511	0.1279
(using actual program characteristics)	(0.0105)	(0.1284)	(0.1700)	(0.0822)
Results varying income eligibility threshold and premium contribution				
Maximum income eligibility = 200% FPL				
No premium contributions	0.6806 (0.0124)	0.3815 (0.1428)	0.5518 (0.1881)	0.1349 (0.0921)
Low premium schedule		0.3798 (0.1422)	0.5528 (0.1882)	0.1350 (0.0921)
Medium premium schedule		0.3815 (0.1428)	0.5518 (0.1881)	0.1349 (0.0921)
High premium schedule		0.3746 (0.1404)	0.5562 (0.1887)	0.1351 (0.0921)
Maximum income eligibility = 300% FPL				
No premium contributions	0.8472 (0.0085)	0.4128 (0.1467)	0.5361 (0.1693)	0.1276 (0.0936)
Low premium schedule		0.3971 (0.1406)	0.5459 (0.1680)	0.1278 (0.0937)
Medium premium schedule		0.3955 (0.1395)	0.5484 (0.1674)	0.1261 (0.0924)
High premium schedule		0.3803 (0.1334)	0.5606 (0.1658)	0.1238 (0.0903)
Maximum income eligibility = 400% FPL				
No premium contributions	0.9273 (0.0053)	0.4261 (0.1541)	0.5295 (0.1528)	0.1251 (0.0984)
Low premium schedule		0.3979 (0.1431)	0.5467 (0.1475)	0.1252 (0.0983)
Medium premium schedule		0.3942 (0.1411)	0.5512 (0.1458)	0.1226 (0.0962)
High premium schedule		0.3728 (0.1319)	0.5687 (0.1403)	0.1186 (0.0924)

Note. Standard errors in parentheses.

in public coverage falls and percentage enrolled in private coverage rises. These effects are more pronounced under an income eligibility threshold of 400 percent FPL versus 200 percent FPL. The predicted percentage of

Figure 1: Simulated Rates of Public Insurance Coverage among Children in Families with Income up to 400 percent FPL under Varying Income Eligibility Thresholds and Premium Schedules

children who are uninsured for a given income eligibility threshold under various premium schedules exhibits very little change, ranging from 12.5 percent to 11.9 percent at the extremes of the premium schedule distribution for an income eligibility threshold of 400 percent FPL and remaining at a steady 13.5 percent under all premium schedules at an income eligibility threshold of 200 percent FPL. In both the 300 and 400 percent income eligibility threshold simulations, we find the counterintuitive result that percentage of uninsured children is lower for medium and high premium schedules compared with for no premium contribution, although the magnitude of the change is small.

Figures 1 and 2 more clearly depict the patterns of coverage outcomes for public coverage and private coverage across the range of premium schedules and income eligibility thresholds. In Figure 1, the downward slope of the top two lines, representing income eligibility thresholds of 400 and 300 percent FPL, shows that the percentage of children enrolled in public coverage decreases as premium contribution requirements increase. Similarly, in Figure 2, the upward slope of the bottom two lines, representing income eligibility thresholds of 400 and 300 percent FPL, indicates that the percentage of children with private coverage increases as public premium contributions increase. The relatively flat slope of the 200 percent income eligibility threshold lines for both public and private coverage reflects that most children

Figure 2: Simulated Rates of Private Insurance Coverage among Children in Families with Income up to 400 percent FPL under Varying Income Eligibility Thresholds and Premium Schedules

in families with incomes less than twice the FPL are exempt from premium contribution requirements even under medium and high schedules. Thus, the effects of such requirements on public and private coverage are limited. Figure 1 shows the percentage of children covered by public insurance is virtually identical regardless of whether the income eligibility threshold is 400 percent or 200 percent of the FPL if public premium contribution requirements are high. Likewise, in Figure 2, when the level of public premium contributions is at a medium or high level, higher income eligibility thresholds have little effect on the percentage of children who are privately insured.

DISCUSSION

This study uses a selection model combined with simulation techniques to understand the effects of CHIP income eligibility thresholds and premium contribution requirements on health insurance coverage outcomes among children targeted by recent CHIP expansions, namely, children in families with incomes up to 400 percent of the FPL.

The simulations provide information about changes in public coverage, private coverage, and uninsurance rates for a stylized set of CHIP program expansions; namely, expansions of income eligibility thresholds from 200 to 400 percent of the FPL with no/low/medium/high premium contribution

schedules, a set waiting period of 4 months, and other program features (e.g., income disregards) set at typical values. The simulation results are useful counterpoints to previous research estimating the average effect of program expansions as they were implemented, but without disentangling the effects of premiums or other program features. Indeed, the ability to tease apart the effects of income eligibility thresholds and premium contribution requirements is a key strength of the simulation approach.

Our point estimates suggest that a program expansion from 200 to 400 percent FPL with no premium contribution (and a 4-month waiting period) decreases uninsurance by about a percentage point, increases public coverage by about 4.5 percentage points, and decreases private coverage by about 2.2 percentage points, although the standard errors associated with our estimates were large and the results were thus not statistically significant. However, the point estimates of changes in uninsurance and public coverage are consistent with earlier work (Gresenz et al. 2012) that found that the 2002–2009 CHIP expansions, as implemented, increased children's insurance coverage by 2 percentage points and take-up of public coverage by 4 percentage points. Both the earlier study and the simulation findings suggest that recent CHIP expansions to higher income children did not affect the rate of insurance coverage to the same degree as the introduction of CHIP did in the late 1990s, likely because higher income families are much more likely than their lower income counterparts to receive insurance offers from their employers. Under the simulated expansion from 200 to 400 percent FPL with no premium requirements, point estimates suggest crowd-out ranges from roughly half to three fourths; a program expansion from 200 to 400 percent FPL with a low premium schedule reduces crowd-out to between roughly one third and one half.⁷ These estimates align with previous research on the expansions as implemented which were associated with crowd-out of up to one half.

With regard to the effects of premium contribution requirements, we find, unsurprisingly, that for a given income eligibility threshold, premium contributions decrease enrollment in public coverage and increase enrollment in private coverage, with greater effects the larger the contributions. For example, at an income eligibility threshold of 400 percent FPL, public coverage is 43 percent and private coverage is 53 percent with no premium contribution, compared to 37 percent and 57 percent under a high premium schedule. We find less sensitivity to premiums in the percentage of children who are uninsured. At an income eligibility threshold of 300 percent FPL, for example, the percentage of children uninsured varies less than one half of one percentage point across the range of premium schedules. Although the changes are not

large in magnitude, the percentage of children who are uninsured falls under medium and high premium schedules at higher income eligibility thresholds, but this counterintuitive result may reflect that families are reluctant to have their children incur several months without insurance to enroll in relatively high-cost public insurance.

Turning to the interplay between income eligibility thresholds and premium schedules, our results suggest most saliently that gains in public coverage and reductions in private coverage under eligibility expansions to higher income families are nullified if the expansions are coupled with premium schedules that require more than a modest contribution (medium or high schedules). For example, the percentage of children enrolled in public coverage is 38 percent under an income eligibility threshold of 200 percent FPL and no premium contribution, versus 37 percent under an income eligibility threshold of 400 percent FPL and a high premium requirement.

Our study has several limitations, some of which arise from the limitations of the CPS-ASEC data. First, there is controversy about the time period to which insurance coverage information obtained from the CPS-ASEC actually applies. Although the interview questions are intended to elicit information from subjects about coverage during the preceding year, there is indirect evidence suggesting that this is not the case (Swartz 1986). In this study, we considered the coverage data to apply to the year of the interview. However, in our earlier work (Gresenz et al. 2012) we found that our results did not change when we considered the coverage data to refer to the year preceding the interviews.

Second, some investigators have argued that distinctions between public coverage and nongroup (i.e., individual) private coverage in the CPS-ASEC data may not be reliable (LoSasso and Buchmueller 2004). But modifications in the interview instrument that were implemented in the early part of the previous decade were specifically aimed at improving this distinction. In preliminary analyses (data not shown), we found that reported nongroup coverage behaved much more like group coverage than like public coverage.

An additional limitation is that we lacked information on certain features of CHIP programs, such as the aggressiveness of public outreach efforts, that may vary over time and are difficult to measure but may influence coverage outcomes. Finally, although our premium likely captures the critical variation in the contribution requirements faced by families, it is measured imperfectly.

The ACA requires that states maintain the eligibility standards in place on the date of enactment of the legislation (March 23, 2010) for children in Medicaid and CHIP through 2019 (Kaiser Family Foundation 2010). Because the cost to families of exchange-based coverage, even considering available

subsidies, is likely to be much higher than the costs of coverage through CHIP, at least at historically observed premium levels (Gresenz et al. 2011), the continuation of these public programs in their current form ensures the availability of affordable coverage to families (Kenney et al. 2011). However, given the sensitivity observed among families to even modest premium contribution requirements, states may be inclined to respond to budgetary pressures and the need to control program spending by increasing premium contribution requirements, thereby chipping away at the relative affordability of CHIP.

In addition, the persistence of uninsurance among children under the range of simulated scenarios points to the importance of ACA provisions to make the process of obtaining coverage transparent and navigable. These include requirements that states adopt streamlined application procedures for insurance coverage—such as online and phone application options, as well as “no wrong door” policies that ensure families are screened for eligibility for all types of insurance programs, regardless of which one they initially apply for—and funding allotted to support outreach and education efforts as well as for health insurance “navigators” (Kenney et al. 2011).

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NOTES

1. Some states offered unsubsidized (full-cost) eligibility for public coverage for higher income children.
2. We measure the price of private insurance as the product of the probability of receiving an offer of employer-sponsored insurance multiplied by employee share of premium for that insurance, plus the probability of not receiving an offer of employer sponsor insurance multiplied by the price of purchasing insurance in the individual market. We proxy for the price of purchasing insurance in the individual market using the total premium cost for a family in a small firm (less than 10 employees).

3. Although we developed and applied detailed models for imputing eligibility, it is impossible to observe all of the factors that may influence eligibility; consequently, eligibility is imputed with some error.
4. Premium values are for a family of three with two children. For a few states, the two-person premium may be for two children or for one parent and one child. Our classification of states into low/medium/high premium states does not take into account variation across states in family maximums or certain other policies related to premium such as penalties associated with premium nonpayment.
5. To complete the low and medium premium schedules, we extended the premium schedules in Washington and Vermont to children at or above 350 percent of the FPL because children in families with incomes at or above this level are currently ineligible in these states.
6. Values of income and other disregards were set to modal values for 2009. Waiting periods were set to 4 months. Each state is assumed to have a separate CHIP program and a parental eligibility waiver. Disregards for Medicaid and SCHIP vary, so we also set a common point of transition from Medicaid to CHIP. Specifically, Medicaid is assumed to cover children in families up to the income level prescribed by federal mandate (100 percent FPL for children six and older, 133 percent FPL for children under six).
7. Crowd-out can be measured as the change in private coverage divided by the change in public coverage or by calculating how much of the increase in public insurance is not explained by a decrease in uninsurance. We used both calculations to determine the crowd-out ranges reported.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Selection Equation Results for Eligible Arm: Public Coverage, Private Coverage, and No Coverage.

Appendix SA3: Selection Equation Results for Ineligible Arm: Public Coverage, Private Coverage, and No Coverage.

Appendix SA4: Main Equation Results for Eligible Arm: Public Coverage, Private Coverage, and No Coverage.

Appendix SA5: Main Equation Results for Ineligible Arm: Public Coverage, Private Coverage, and No Coverage.