Online Appendix to

"Estimating Heterogeneous Take-up and Crowd-Out Responses to Existing Medicaid Income Limits and Their Nonmarginal Expansions"

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This supplementary material includes equations needed to calculate take-up, private coverage, and crowd-out for the currently eligible (in Section 1), an example of how to use the delta method to calculate standard errors for these treatment effects (in Section 2), and the parameter estimates from our model (Section 3).

1. Equations to Calculate Estimates and Standard Errors of Medicaid Take-up, Private Insurance Coverage and Crowd-out For the Currently Eligible

The predicted average take-up rate among all currently eligible individuals (the ATET) when ignoring selection is given by

$$\begin{aligned} ATRE &= \frac{1}{N_e}\sum_{elig=1} \Pr(pub_i = 1 \mid elig_i = 1) = \frac{1}{N_e}\sum_{elig=1} \Pr(pub_i = 1) \\ &= \frac{1}{N_e}\sum_{elig=1} [1 - \Phi_1(-X_i\hat{\mu})], \end{aligned} \tag{1}$$

where N_e denotes the number of currently eligible children, and the conditional probability equals the marginal probability because we are ignoring selection. Private insurance coverage rates among the currently eligible in the absence of selection are given by

$$\begin{aligned} NEWPRE &= \frac{1}{N_e}\sum_{elig=1} \Pr(priv\_elig_i = 1 \mid elig_i = 1) = \frac{1}{N_e}\sum_{elig=1} \Pr(priv\_elig_i = 1) \\ &= \frac{1}{N_e}\sum_{elig=1} [1 - \Phi_1(-X_i\hat{\gamma}_e)]. \end{aligned} \tag{2}$$

Counterfactual private insurance coverage rates among the currently eligible, if their eligibility was taken away, are given by (in the absence of selection)

$$PRNE = \frac{1}{N_e}\sum_{new=1} \Pr(priv\_nelig_i = 1 \mid elig_i = 1) = \frac{1}{N_e}\sum_{elig=1} \Pr(priv\_nelig_i = 1)$$
$$= \frac{1}{N_e}\sum_{elig=1} [(1 - \Phi_1(-X_i\hat{\gamma}_{ne})]. \tag{3}$$

Thus we can measure average crowd-out among the currently eligible when we ignore selection as

$$PRE - PRNE = \frac{1}{N_e}\sum_{elig=1} [1 - \Phi_1(-X_i\hat{\gamma}_e)] - \frac{1}{N_e}\sum_{elig=1} [1 - \Phi_1(-X_i\hat{\gamma}_{ne})]. \tag{4}$$

When we allow for selection, the predicted average take-up rate among all currently eligible children is given by

$$ATRESEL = \frac{1}{N_e}\sum_{elig=1} \Pr(pub_i = 1 \mid elig_i = 1) = \frac{1}{N_e}\sum_{elig=1} \frac{\Pr(pub_i = 1, elig_i = 1)}{\Pr(elig_i = 1)}$$
$$= \frac{1}{N_e}\sum_{elig=1} \frac{\Pr(X_i\hat{\mu} + \varepsilon_i > 0, Z_i\hat{\delta} + e_i > 0)}{\Pr(Z_i\hat{\delta} + e_i > 0)} = \frac{1}{N_e}\sum_{elig=1} \frac{\Phi_2(X_i\hat{\mu}, Z_i\hat{\delta}, \hat{\rho}_{\varepsilon,e})}{\Phi_1(Z_i\hat{\delta})}. \tag{5}$$

Private insurance coverage rates among the currently eligible are given by

$$PRESEL = \frac{1}{N_e}\sum_{elig=1} \Pr(priv\_elig_i = 1 \mid elig_i = 1) = \frac{1}{N_e}\sum_{elig=1} \frac{\Pr(priv\_elig_i = 1, elig_i = 1)}{\Pr(elig_i = 1)}$$
$$= \frac{1}{N_e}\sum_{i \in New} \frac{\Pr(X_i\hat{\gamma}_e + u_e > 0, Z_i\hat{\delta} + e_i > 0))}{\Pr(Z_i\hat{\delta} + e_i > 0)} = \frac{1}{N_e}\sum_{elig=1} \frac{\Phi_2(X_i\hat{\gamma}_e, Z_i\hat{\delta}, \hat{\rho}_{13})}{\Phi_1(Z_i\tilde{\delta})}. \tag{6}$$

If they were ineligible for Medicaid, the currently eligible children would have private coverage given by

$$PRNESEL = \frac{1}{N_e}\sum_{elig=1} \Pr(priv\_nelig_i = 1 \mid elig_i = 1) = \frac{1}{N_e}\sum_{elig=1} \frac{\Pr(priv\_nelig_i = 1, elig_i = 1)}{\Pr(elig_i = 1)}$$

$$= \frac{1}{N_e}\sum_{elig=1} \frac{\Pr(X_i\hat{\gamma}_{ne} + u_{ne} > 0, Z_i\hat{\delta} + e_i > 0)}{\Pr(Z_i\hat{\delta} + e_i > 0)} = \frac{1}{N_e}\sum_{elig=1} \frac{\Phi_2(X_i\hat{\gamma}_{ne}, Z_i\hat{\delta}, \hat{\rho}_{23})}{\Phi_1(Z_i\hat{\delta})}. \quad (7)$$

We measure crowd-out when accounting for selection among the currently eligible by calculating (6) minus (7) or

$$PRESEL - PRNESEL = \frac{1}{N_e}\left[\frac{1}{N_e}\sum_{elig=1} \frac{\Phi_2(X_i\hat{\gamma}_e, Z_i\hat{\delta}, \hat{\rho}_{13})}{\Phi_1(Z_i\tilde{\delta})} - \sum_{elig=1} \frac{\Phi_2(X_i\hat{\gamma}_{ne}, Z_i\hat{\delta}, \hat{\rho}_{23})}{\Phi_1(Z_i\hat{\delta})}\right]. \quad (8)$$

2. An Example of Using the Delta Method to Calculate Standard Errors for the Treatment Effects

Here we calculate the variance of crowd-out among the currently eligible in the case where we ignore selection (equation 4 above) using the delta method; calculation of the variances of all other treatment effects is done similarly. The delta method is based on the fact that if $y = g(x)$ and $Var(x) = \Omega$, then $Var(y) = \left[\frac{\partial g(x)}{\partial x}\right]^t \Omega \left[\frac{\partial g(x)}{\partial x}\right]$. Let Σ^* denote the portion of Σ corresponding to $\hat{\gamma}_e$ and $\hat{\gamma}_{ne}$, where Σ is the variance covariance matrix of the minimum distance estimates, and

$$\omega^t = \frac{1}{N_e}\left[\left(\frac{\partial \sum_{elig=1} [1 - \Phi_1(-X_i\hat{\gamma}_e)]}{\partial \gamma_e}\right)\left(\frac{-\partial \sum_{elig=1} [(1 - \Phi_1(-X_i\hat{\gamma}_{ne})]}{\partial \gamma_{ne}}\right)\right]; \quad (9)$$

note that these derivatives can be taken numerically. Then

$$V(PRE - PRNE) = \omega^t \Sigma^* \omega. \quad (10)$$

3. Parameter Estimates for Medicaid Eligibility, Medicaid Participation and Private Insurance Coverage from the Switching Probit Model

	Medicaid Eligibility (1)	Medicaid Participation (2)	Private Coverage When Eligible (3)	Private Coverage When Not Eligible (4)
Size of Household	0.28***	0.15***	-0.14***	-0.12***
	(0.01)	(0.01)	(0.01)	(0.01)
White	-0.26***	-0.32***	0.26***	0.27***
	(0.02)	(0.03)	(0.03)	(0.02)
Male	-0.01	0.004	0.01	0.004
	(0.01)	(0.01)	(0.01)	(0.01)
Two parents	-0.83***	-0.84***	0.55***	0.42***
	(0.02)	(0.03)	(0.03)	(0.03)
Male head only	-0.26***	-0.78***	0.21***	0.17***
	(0.04)	(0.06)	(0.06)	(0.04)
No earners	2.45***	1.86***	-1.83***	-1.78***
	(0.05)	(0.11)	(0.11)	(0.05)
One earner	0.99***	0.73***	-0.67***	-0.60***
	(0.05)	(0.10)	(0.10)	(0.03)
Two earners	0.11**	0.33***	-0.19*	-0.15***
	(0.05)	(0.10)	(0.10)	(0.03)
Highest earner's age	-0.03***	-0.01***	0.02***	0.01***
	(0.001)	(0.002)	(0.001)	(0.001)
High School Drop-out	1.37***	1.12***	-1.43***	-1.42***
	(0.03)	(0.06)	(0.05)	(0.03)
High School Graduate	0.88***	0.86***	-0.90	-0.76
	(0.02)	(0.06)	(0.05)	(0.03)
Some College	0.58***	0.67***	-0.61	-0.44
	(0.03)	(0.06)	(0.05)	(0.03)
FRACELIG	0.48***	-	-	-
	(0.01)			

Notes: All index functions include demographic main effects, year, age, and state dummies. Standard errors have been corrected for repeated observations across the same children. The estimates are based on minimum distance estimates from equation (19).
*** significantly different from zero at the 1% level; ** significantly different from zero at the 5% level; * significantly different from zero at the 10% level.