



Abt Associates Inc.

**Technical Appendix to  
“Insuring the  
Uninsurable: The  
Growth in High-Risk  
Pools”**

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# **Insuring the Uninsurable: The Growth of High-Risk Pools**

## **Technical Appendix**

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This technical appendix to “Insuring the Uninsurable: The Growth in High-Risk Pools”<sup>1</sup> describes the estimation of the elasticity of enrollment with respect to premium for high-risk pools. Motivation for estimation of this elasticity and details regarding the data used in doing so are provided in the body of the paper.

To estimate the elasticity, we began with the specification

$$(1) \quad \log(\text{enroll ment}_{s,y}) = \mathbf{a} + \mathbf{b}_1 \log(\text{premiu m}_{s,t}) + \mathbf{b}_2 \text{lowest deductible}_{s,t} \\ + \mathbf{b}_3 \text{multiple deductible}_{s,t} + \mathbf{b}_4 \log(\text{uninsu red population}_{s,t}) \\ + \mathbf{b}_5 \log(\text{per capita income of uninsured}_{s,t}) \\ + \mathbf{b}_6 \text{year}_t + \mathbf{e}_{s,t}$$

where the subscript s indicates state, the subscript t indicates year and all the variables are as defined in Table 1 below. Because the actual high-risk pool premium was not available for enough states and years to permit the estimation of equation (1), we used a proxy defined as

$$(2) \quad \text{proxy premium}_{s,t} = (\text{pct. of market premium}_{s,t}) \times (\text{per capita Medicare expenditure}_{s,t})$$

where per capital Medicare expenditure serves as a proxy for state-to-state/year-to-year variation in the actual market premium. The percent of market premium variable is defined in Table 1.

One problem with this specification is that plan administrators might adjust premium levels in reaction to unexpected enrollment changes. In particular, if enrollment is higher than budgeted, plan administrators might raise premiums in an effort to keep enrollment and losses in line with legislative expectations. Thus, to the extent that enrollment changes might cause premium changes, the premium variable in equation (1) is endogenous. To address this endogeneity, we estimate equation (1) by instrumental variables using lagged values of the log of proxy premium, the percent of market premium, and per capital Medicare expenditure as instruments for the log of proxy premium.

Table 2 provides the estimated coefficients for (1) using the proxy premium of (2) and instrumental variables as described (denoted as specification “A”). Our elasticity estimate for this specification is -1.9, which is the value used in the simulation described in the body of the paper. Other specifications were studied including a version of (1) without a year variable and using the actual premium—without instruments—instead of the proxy premium (specification “B”).<sup>2</sup> Results for these two specifications are provided in Table 2. Notice that the elasticity we used in our simulation (that of specification “A”) is consistent with that obtained using other specifications and is the most conservative of the two presented in Table 2.

Other researchers have also consistently found that individual insurance purchase responds to price, although magnitudes vary according to the population studied and the source of price variation (see the list of references included below). The market for high-risk pools is unique in that potential enrollees are known to have higher expected health care utilization than the general public as well as being older, having lower incomes, and being less likely to be working. In a study of disenrollment from eight states' high-risk pools, Stearns and Mroz observe that several

<sup>1</sup> By A. Frakt, S. Pizer, and M. Wrobel, *HSRE Working Paper*, No.12, Abt Associates Inc., May 15, 2002.

<sup>2</sup> Comparable results were also obtained using specifications with year dummies and/or state dummies and/or a single cross-section of states.

fold increases in disenrollment rates occurred at the time of selected premium increases, though the degree of response varied across states. This is consistent with our results.

## References

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**Table 1: Definition of Variables (N = 137, except where indicated)**

<i>Variable<sup>(a)</sup></i>	<i>Definition/Comment</i>	<i>Mean</i>	<i>St. Dev.</i>	<i>Min.</i>	<i>Max.</i>
$\log(\text{enrollment}_{s,y})$	Log of high-risk pool enrollment.	7.33	1.10	5.16	10.32
$\log(\text{premium}_{s,t})$	Log of high-risk pool premium. Only available for 58 observations.	5.39	0.31	4.75	6.05
$\log(\text{proxy premium}_{s,y})^{(c)}$	See equation (2).	8.89	0.27	8.42	9.68
$\text{pct. of market premium}_{s,y}$	High-risk pool premium as percent of market premium. See equation (2).	1.52	0.23	1.18	2.00
$\text{per capita Medicare expenditure}_{s,y}$	Used as proxy for market premium. See equation (2).	4,912	924	3,139	8,002
$\text{lowest deductible}_{s,y}$	Controls for generosity of benefits. <sup>(b)</sup>	543.80	235.10	0.00	1,000
$\text{multiple deductibles}_{s,y}$	Controls for generosity of benefits. <sup>(b)</sup>	0.85	0.35	0.00	1.00
$\log(\text{uninsured population}_{s,y})$	Controls for demand.	12.81	0.78	10.87	14.43
$\log(\text{per capita income of uninsured}_{s,y})$	Controls for demand.	10.46	0.18	10.08	10.86
$\text{year}_y$	Controls for trends in enrollment and premiums	1,997.58	1.70	1995	2000
$\text{lag log(proxy premium}_{s,y})^{(c)}$	Used as an additional instrumental variable for $\log(\text{proxy premium}_{s,y})$ .	8.86	0.27	8.20	9.68
$\text{lag pct. of market premium}_{s,y}^{(c)}$	Used as an additional instrumental variable for $\log(\text{proxy premium}_{s,y})$ .	1.52	0.22	1.25	2.00
$\text{lag per capita Medicare expenditure}_{s,y}^{(c)}$	Used as an additional instrumental variable for $\log(\text{proxy premium}_{s,y})$ .	4,775	992	2,425	8,002

(a) Subscript *s* indexes states (Alabama, Alaska, Arkansas, Colorado, Connecticut, Illinois, Indiana, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, Oregon, South Carolina, Utah, Washington, Wisconsin, Wyoming). Subscript *y* indexes years (1995-2000). Not every state has an observation in every year. Three states are excluded: California (enrollment is capped), Florida (pool is closed), and Texas (not in equilibrium).

(b) Benefits vary by state and year and were not consistently provided in our data sources. Deductible levels, however, were consistently provided and serve as a measure of plan generosity.

(c) As described in the text, to remove endogeneity, we instrumented for  $\log(\text{proxy premium}_{s,t})$ . The instruments were lag  $\log(\text{proxy premium}_{s,t})$ , lag pct. of market premium  $_{s,t}$ , and lag per capita Medicare expenditure  $_{s,t}$ .

Sources: *Communicating for Agriculture, Inc.*, “Comprehensive Health Insurance for High-Risk Individuals,” (1995-2001/2002), U.S. Census Bureau, *Statistical Abstract of the United States (1995-2001)*, U.S. Census Bureau, *Current Population Survey (1999-2001)*.

**Table 2: Estimation Results (Dependent Variable  $\log(\text{enrollment}_{s,t})$ )**

Variable	Coefficient (Standard Error)	
	Spec A: Proxy premium <sup>(a)</sup>	Spec B: Actual premium
$\log(\text{proxy premium}_{s,t})$	-1.90*** (0.41)	N/A
$\log(\text{premium}_{s,t})$	N/A	-2.07*** (0.36)
lowest deductible <sub>s,t</sub>	0.000091 (0.00040)	0.00032 (0.00055)
multiple deductibles <sub>s,t</sub>	-0.23 (0.25)	-0.44 (0.39)
$\log(\text{uninsured population}_{s,t})$	0.77*** (0.12)	0.68*** (0.12)
$\log(\text{per capita income of uninsured}_{s,t})$	1.03* (0.52)	2.10** (0.67)
year <sub>t</sub>	0.67 (0.051)	N/A
constant	-129 (100)	-11.8 (6.81)
	N = 137, R <sup>2</sup> = 0.25	N = 68, R <sup>2</sup> = 0.53

(a) As described in the text, to remove endogeneity, we instrumented for  $\log(\text{proxy premium}_{s,t})$ . The instruments were lag  $\log(\text{proxy premium}_{s,t})$ , lag pct. of market premium<sub>st</sub>, and lag per capita Medicare expenditure<sub>st</sub>.

\* Significant at the 5% level.

\*\* Significant at the 1% level.

\*\*\* Significant at the 0.1% level.

Sources: *Communicating for Agriculture, Inc.*, "Comprehensive Health Insurance for High-Risk Individuals," (1995-2001/2002), U.S. Census Bureau, *Statistical Abstract of the United States (1995-2001)*, U.S. Census Bureau, *Current Population Survey (1999-2001)*.