Employment-Based Health Insurance: Analysis of Rural-Urban Differences in One State

Patricia Ketsche
Georgia State University

This study estimates the propensity of firms to offer health insurance in a simultaneous equation model to control for the endogeneity between wages and health insurance. Previous research finds differences in rural and urban employer behavior with respect to health insurance benefits fully explained by differences in wages and firm size. In contrast, this study finds residual unexplained differences in the propensity to offer coverage that may be attributable to differences in plan supply, plan distribution, or differences in availability of substitutes for coverage (safety net care). Rural worker participation in offered coverage is more responsive to wage level than is the participation decision of urban workers. Together, these results imply that some of the differences in health insurance coverage rates for rural workers could be amenable to policy interventions.

Keywords: *rural health; employment-based health insurance; insurance coverage; fringe benefits*

BACKGROUND

In 1987, Freeman et al. published a report on access to health care for Americans that suggested that rural Americans receive on average as much medical

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care as their urban counterparts and that the goal of closing the rural/urban gap in access had been substantially achieved. Despite that pronouncement, there are indicators that rural populations continue to lag behind the rest of the country on several key measures. Data from the Current Population Survey (CPS) and other surveys suggest that rural workers are less likely to have private health insurance coverage than workers living within metropolitan statistical areas. In many areas, this gap is reduced by high rates of public coverage, and surveys provide conflicting measures of whether rural populations nationally are significantly more likely to be uninsured (Pol 2000). At a minimum, evidence suggests that rural populations and residents of highly urbanized central city locations are more likely to lack health insurance than other Americans (National Center for Health Statistics 2001). However, in some parts of the country, most notably the South, rural populations, among all residents, are at the highest risk of being uninsured.[1]

One of the primary barriers to accessing health care services is the lack of health insurance. For example, reduced access to coverage is linked to reduced use of primary and preventive care and hospital services (Spillman 1992; Long and Marquis 1994). Moreover, there is a possibility that lack of coverage causes an increase in the use of emergency room services (Freeman et al. 1990). In addition, the era of state budget shortfalls limits the likelihood of expansions of public programs to meet the needs of the working uninsured. Therefore, understanding the reasons for low levels of employment-based coverage is important in order to design policies to expand coverage for rural working populations.

NEW CONTRIBUTION

Previous research (Coburn et al. 1998) concludes that observed differences in employment based coverage between urban and rural firms are fully explained by differences in firm size and wages. This suggests that expanding access to employment-based coverage for rural employees will be problematic because these characteristics are not easily amenable to interventions. However, in Georgia and possibly in other states, rural firms are only slightly smaller on average than urban firms, and most of the difference is concentrated among the largest firms. If, at least in some states, some of the difference in offer rates between rural and urban firms is attributable to factors that are mutable to policy in addition to the aforementioned firm size and wage characteristics, options for expanding employment-based coverage in some rural areas may be more viable than previously thought.

In addition, I note that although rural employers are significantly less likely to offer coverage to workers, conditional upon working for a firm offering

coverage, rural employees in Georgia appear to participate in offered plans at a higher rate than their urban counterparts, unlike the patterns observed in the above-referenced study. These differences point to the need for more studies of insurance market behavior at the local or state level to understand the applicability of national or multistate studies to the local market. Finally, this study makes an important methodological contribution by estimating the likelihood of offering insurance jointly with total compensation, thus controlling for the endogeneity between wages and health insurance.

The remainder of this article reviews existing literature regarding rural workers and health insurance coverage, discusses the economic theory and a model for worker demand for coverage, presents findings on determinants of differential coverage rates for rural employers from a statewide survey of employers in one southern state, and describes the policy relevance of these findings.

LITERATURE REVIEW

Access to coverage is one of several areas in which rural populations lag behind their urban counterparts. Rural populations are also less likely to be employed, less likely to have a college education, and more likely to receive some kind of public assistance than populations living within metropolitan statistical areas (March 2002 CPS). These differences have resulted in specific policies designed to facilitate economic development in the nation's rural communities. Some of those policies focus on a strategy of small business development. If rural economic development is dependent on a strategy of small business programs, then it is important to understand the total compensation reflected by both wages and benefit structure, in particular for workers at small rural firms. In a study of fringe benefit provision by rural small businesses, Variyam and Karybill (1998) found owner or manager educational attainment and worker skill level to be significant predicators of offer rates for all benefits. The authors found no significant impact of firm size on the provision of all non-health-related benefits but found offer rates for health insurance largely determined by the size of the establishment. The authors only surveyed rural firms, so they were unable to compare the effect of firm size on provision of health insurance among rural firms with similarly situated urban firms.

Frenzen (1993) and Coward, Clark, and Seccombe (1993) suggested that most of the observed differential in employment-based coverage between urban and rural firms is attributable to systematic differences in firm characteristics such as size and wages. Frenzen decomposes urban rural differences in coverage using data from the 1990 CPS to demonstrate limited rural access

to coverage because of fewer opportunities to work for the largest size employers and because of depressed wages in rural communities. Coward, Clarke, and Seccombe draw on data from the 1987 National Medical Expenditure Survey to show in a multivariate context that rural/urban differences in employment-based coverage do not persist once personal and job-related characteristics are taken into account. Both of these studies rely on household data rather than employer data to explore this question. They use sources that are now quite dated, so the results may no longer apply if rural patterns of employment have changed since the late 1980s. In addition, both studies use aggregated national data in the analysis, although there are strong regional variations in the composition of rural populations, rural income, and in access to care both with and without coverage in rural areas.

As noted above and like the previous authors, Coburn et al. (1998) concluded that most of the observed differential in employment-based coverage between urban and rural firms is attributable to systematic differences in firm size and wages. Using data from the Community Tracking Survey (CTS), the authors found that the lower probability that a worker is covered in rural areas is fully eliminated when rural firm sizes and wages are adjusted to reflect the characteristics of urban firms. This would suggest that lower levels of coverage in rural areas can be attributed to factors that are not easily addressed by state policy makers. There are, however, methodological problems with using wages to predict coverage in isolation. Wages are endogenous to coverage if benefits substitute for cash wages and total compensation reflects marginal productivity.

Ormond, Zuckerman, and Lhila (2000) used the National Survey of American Families to demonstrate the significant differences in public and private coverage rates, self-reported health status, and utilization of services for rural populations across states. They found that although nationally rural areas fare worse than their urban counterparts on all measures, in some states, the differences between urban and rural areas are much larger than indicated by the national numbers. These results demonstrate the possibility that studies of a cross-state sample of rural firms may not apply to all states because of local market variation. There is a need to control for the local market conditions and demographics of the specific rural population studied when analyzing rural demand for health insurance.

This study builds on the previous research of the determinants of rural employment-based coverage. Like Coburn et al., data are from employers rather than households, and the analysis focuses on the likelihood that employers offer coverage to at least some of their employees. The analysis evaluates the impact of firm, worker, and market variables on offer rates while

controlling for total compensation. This method generates results that differ significantly from estimation of an isolated demand equation. The analysis of urban and rural firms in a single state eliminates unmeasured effects of different state policies such as rural economic development programs, eligibility requirements for public programs, and state income tax rates. These new data from Georgia provide a unique opportunity for this analysis because of the ability to control for local labor and health market variables that affect cost of living and the demand for insurance in Georgia's 159 counties. By controlling for differences in cost of living, the measured effect of compensation on coverage should reflect real rather than nominal income. Although the systematic differences between rural and urban firms in this study are somewhat different from those presented in previous work, they may reflect the changing nature of rural employment markets or the rural economy in some parts of the country. Further analysis of different states would clarify this difference.

THEORETICAL MODEL

Whether or not a firm offers health insurance as a benefit to employees is determined by the demand for coverage among the firm's potential labor pool and the cost of coverage in the local market. That demand for insurance will determine the value potential workers will place on coverage and the extent to which cash wages can be reduced because health insurance is offered. The profit-maximizing firm will offer coverage (I) if, in the aggregate, the cost of coverage reduces total compensation costs.[2] Therefore, total compensation is modeled as shown in equation (1.1)

$$TC = w + \pi_{er}(I) + p \times B, \tag{1.1}$$

where

- TC = total compensation
- w = cash wages
- π_{er} = employer share of the premium for coverage
- p = vector of prices of all other benefits
- B = vector of all other benefits offered (pension, legally required benefits, vacation, etc).

Worker demand for coverage is modeled by the index function

$$I^* = f[E(W, H, (c \times M))], \tag{1.2}$$

where demand is a value of the expectation, reflecting the uncertainty associated with required health care services, and

I^* = the demand for insurance coverage (I)
W = wages
H = health status of the worker
c = cost of medical care
M = medical care required

Although I^* is not observable, insurance (I) is offered if in the aggregate for all workers at a firm $I^* > 0$.

These equations clearly show the endogeneity problem between wages and health insurance, because wages are a function of coverage in equation 1.1 but determine the demand for coverage in equation 1.2. One of the primary determinants of the demand for health insurance is income. Grossman (1972) demonstrated that the demand for health, and hence coverage for health care as an input into health, should be increasing in education and in wages. In addition, normal utility theory suggests that workers will have increasing relative risk aversion (Eeckhoudt and Gollier 1995). The safety net provisions create a price for care that is increasing in wealth, suggesting an increasing preference for coverage as wages increase. A progressive tax system implies that the price for coverage is decreasing in income, further stimulating demand for coverage among high-wage earners.

As noted above, there are significant differences in nominal family income and wages between rural and urban populations. Workers in rural areas should be expected to accept nominally lower compensation than workers in urban areas for comparable work if the reduction in income is at least offset by an increase in purchasing power of the income because of lower cost of living. If the reduction in income is not totally offset by lower cost of living, lower real wages in rural areas reflect a preference for rural living or a lack of mobility among workers. This reduction in real earnings would imply a lower demand for coverage if health care costs are a constant share of income for rural and urban populations.

EMPIRICAL MODEL

To accurately estimate the demand for coverage as a function of income, the estimation must occur while controlling for total compensation.

$$\text{Total Compensation} = f\,(\beta_f X_f + \beta_l X_1 + \beta_{COL} X_{COL} + \gamma_{1a} Rural + e_1) \qquad (1.3)$$

This equation sets total compensation for labor at a given firm as a function of a vector of firm characteristics such as the output market for goods or services for each industry and firm size, which may reflect the efficient production process (X_f in Equation 1.3). It is also a function of the total productivity of the labor force, which will be determined by their age, tenure, and education (X_l in Equation 1.3). There is a differential cost of labor in each market that is determined by the local cost of living (X_{COL} in Equation 1.3). Finally, I include a dummy variable for rural markets. The estimated coefficient for that dummy (γ_{1a}) reflects the extent to which frictions in the labor market reduce mobility or a differential that reflects preference for rural living. I expect (γ_{1a}) to be less than zero if labor is not completely mobile or if some workers prefer to live in rural areas.

The likelihood of coverage is estimated simultaneously using the equation

$$P(HI = 1) = f(\beta_f X_f + \beta_l X_1 + \beta_{loc} X_{loc} + \gamma_0 totalcomp + \gamma_{1b} Rural + \gamma_2 (Rural \times totalcomp) + \gamma_3 (Rural \times firmsize) + e_2) \quad (1.4)$$

That likelihood depends on a vector of firm characteristics, such as firm size, that determine the efficiency with which insurance can be purchased (X_f in Equation 1.4); worker characteristics, such as age and education, that determine the expected quantity of care that will be demanded (X_1 in Equation 1.4); and local health care market characteristics that influence access to care in the absence of coverage and the relative cost of health care services (X_{loc} in Equation 1.4). Finally, key variables for this study include the effect of compensation (γ_0), the marginal impact of rural location (γ_{1b}), and the differential impact of compensation and firm size for rural firms (γ_2, γ_3) on the likelihood of offering coverage.

The correlation between error terms implies joint estimation of the two equations. In a simultaneous equation model, γ_0 should be positive and reflects the increasing demand for coverage with income. Given adequate adjustment for the differences in cost of living in the first equation and for differential health care market variables in the second equation, and if rural-urban preferences are similar, then the marginal impact of rural location (γ_{1b}) and rural wages and firm size (γ_2, γ_3) on offering coverage in Equation 1.4 are expected to be insignificantly different from zero. However, if demand for coverage at rural firms differs significantly from the demand for coverage at similar urban firms, then the coefficients will be significantly different from zero. That result would suggest systematic variation in preference for health insurance arising from unmeasured differences (γ_{1b}) or from differences in

compensation (γ_2). If γ_3 is significantly different from zero, then firm size has a different impact on coverage for rural firms than for urban firms.[3]

Finally, the determinants of participation in offered coverage for rural and urban firms conditional on coverage being offered is assessed using the equation

$$\text{Participation Rate} = f(\beta_f X_f + \beta_l X_l + \gamma_0 wage + \gamma_{1b} Rural + \gamma_2(Rural \times wage) + \gamma_3(\text{Rural} \times firmsize) + e, \quad (1.5)$$

where X_f and X_l represent characteristics of the firm and the labor force, respectively. The estimated coefficients in this regression (γ_2, γ_3) reflect the marginal effect of wages and firm size on participation rates in rural firms.

DATA

A health benefits survey of business establishments in Georgia, selected at random based on firm size and location, was performed by Georgia State University between October 2002 and January 2003. The purpose of the survey was to gather information about the characteristics of these establishments' workforces and the benefits available to employees. The sample for the survey was drawn from the ES202 Firm-level Employment and Address Data, collected by the Georgia Department of Labor, and compiled from the Tax and Wage Report, which is filed quarterly by each Georgia employer covered by unemployment insurance legislation. The sample was selected to be representative of all firm sizes and of rural Georgia, metropolitan Atlanta, and all other metropolitan statistical areas (MSAs) in the state. A total of 7,099 establishments were initially identified for inclusion in the sample. Of those selected, 668 were dropped because the address was identified as undeliverable either because the firm had ceased operation, relocated to an undisclosed location, or merged with another firm.

The survey was mailed to selected establishments with a request that it be forwarded to the individual responsible for employee benefits. The employer or representative was asked to complete one of two forms depending on whether or not employees were offered health benefits. Respondents could elect to submit replies electronically, by fax, or by mail in a prepaid envelope. A follow-up postcard was mailed to establishments that had not responded 3 weeks after the initial mailing, and a second survey was sent to those establishments that had not yet responded after 6 weeks. A total of 1,430 employers responded to the survey—a response rate of 22 percent.

Table 1 shows the variation in response rate by region, firm size, and whether the establishment was a single-site firm or part of a multisite establishment. Establishments in Atlanta had lower response rates than did establishments in all other parts of the state. Response rates among all establishments with fewer than 100 employees were comparable, although response rates among larger firms and firms with multiple locations dropped significantly. After adjusting for the sampling frame, the median number of employees at responding firms is seven, whereas the median number of employees working at non-responding firms is nine. The differences between responding and nonresponding firms suggest the potential for nonresponse bias to influence analysis of these data and hence the need for testing for response bias as described in the following section. Responses are weighted to reflect the likelihood of being sampled, and weights are further adjusted to reflect the likelihood of response based on the above characteristics.

CHARACTERISTICS OF RURAL FIRMS IN GEORGIA

Table 2 shows the characteristics of the firms in Georgia (total) and differentiated by rural and urban establishments.

Rural firms in Georgia are significantly less likely to offer coverage than urban firms (53 versus 67 percent) but, conditional on offering coverage, rural workers are significantly more likely to participate in a plan for which they are eligible (87 versus 77 percent).[4] Unlike the firms represented in the study by Coburn et al. (1998), the distribution of workers by firm size in rural Georgia is only marginally different than at urban (MSA) firms. Table 2 shows the percentage of establishments and the percentage of workers at establishments in rural and urban Georgia falling into each size category and the average establishment size for each category. Although the overall average firm size differs slightly between rural and urban, almost all of this difference is attributable to the difference in size of the largest firms, and almost all of these firms offer coverage to their workers. Therefore, it is not apparent that difference in rural offer rates will be linked to differences in firm size for rural employers.

The difference between rural and urban nominal wages in Georgia is substantial. For the fourth quarter of 2001, rural firms report a mean monthly wage of $1,998, while the urban establishments report mean monthly wages of $2,934. This significant difference appears to be somewhat offset by cost-of-living differences between rural and urban areas. For example, the median rent for all of rural Georgia is $427, substantially lower than the $650 for urban counties. The Medicare practice cost index for adjusting physician payments in rural Georgia is 0.892, while for metropolitan Atlanta, the adjustment factor

TABLE 1 Response Rate by Key Characteristics

	Net Establishments Surveyed	*Response Rate (%)*
Atlanta	2,123	16
Rural Georgia	2,344	26
All other MSAs	1,964	24
Under 10	1,345	23
10 to 24	1,367	24
25 to 99	2,363	24
100 to 999	1,139	18
1,000 or more	217	14
Single site	5,069	24
Multisite	1,362	14

Note: MSA = metropolitan statistical area.

is 1.059, suggesting about 16 percent lower physician practice costs in rural areas. This comparison implies that observed differences in nominal wages exaggerate the underlying differences in real compensation because of cost-of-living differences, but that differences in expected medical costs may be smaller than differences in other expected expenditures, particularly rent.

METHOD

Total average compensation at each firm is estimated by adjusting mean wages for all benefits provided. Data from the Bureau of Labor Statistics (BLS) for the fourth quarter of 2002[5] are used to generate total mean compensation by adjusting wages by the factors shown in Table 3 for each of the benefits reportedly offered to employees.

For those firms reporting health insurance offering and premium information, total compensation increases by the mean of firm cost for single and family coverage. For those firms reporting health insurance offering but no premium information (16 percent of those offering), average premium costs based on firm size are imputed to estimate health insurance contribution to total compensation. Although average wages as a percentage of total compensation (80 percent) for the firms in this sample are slightly higher than the national mean for the fourth quarter of 2002 reported by BLS (73 percent), wages in these data include supplemental pay such as bonuses and shift differentials. Although cash compensation, those payments are classified as benefits by BLS.

TABLE 2 Characteristics of Urban and Rural Establishments and Markets in Georgia

	Total	*Urban*	*Rural*	*Significance*
Establishments	141,499	111,590	29,909	
Employees	3,439,378	2,809,421	629,957	
Offer health insurance	3,040,020	2,516,402	523,617	
Eligible for coverage	2,560,288	2,112,203	448,085	
Participating in offered health insurance	2,023,236	1,632,064	391,172	
Percentage establishments offering	64	67	53	***
Percentage workers at establishments that offer	88	90	83	***
Percentage worker eligible (if offered)	84	84	86	
Percentage participating if eligible	79	77	87	*
Percentage of total workers covered	59	58	62	
Percentage of establishments by firm size				
< 10 employees	51	50	53	
10-24 employees	15	15	14	
25-99 employees	11	11	9	
100+ employees	23	24	23	
Percentage of employees at establishments by firm size				
< 10 employees	9	8	11	
10-24 employees	9	9	10	
25-99 employees	16	17	16	
100+ employees	66	66	63	*
Average wages	$2,736	$2,934	$1,998	**
Average total compensation	$3,407	$3,658	$2,472	**
Worker characteristics				
Percentage workers earning < $9 per hour	18	16	27	**
Percentage workers earning > $24 per hour	23	26	13	**
Percentage female	50	50	50	
Percentage tenure under 1 year	17	17	17	
Percentage tenure more than 5 years	41	41	43	
Percentage employees < 25	10	9	12	*

(continued)

Table 2 (continued)

	Total	*Urban*	*Rural*	*Significance*
Market variables				
Median household income	$43,778	$46,555	$33,261	***
Median monthly rent	$603	$650	$427	***
Families living below federal poverty level	10.2	9.5	12.8	***
Medicare practice cost index	0.98	1.06	0.89	NA
Physicians per 100,000	205.7	228.3	121.7	***

* Differences significant at $\alpha = .10$ level. ** Differences significant at $\alpha = .05$ level. *** Differences significant at $\alpha = .01$ level.

A regression model for total compensation and a logistic model for the probability of offering any health insurance are each estimated separately to generate start values for a joint estimation. The two equations are then estimated simultaneously using a nonlinear (logistic) offer equation. The simultaneous regression controls for the joint error terms. Identification is dependent on the inclusion of health care market variables in the offer equation (county-level estimates of physicians per capita, hospital beds, MSA-level estimates of the average hospital wages used to adjust Medicare hospital payments) and labor market variables in the total compensation equation (percentage of county employees college educated, population density).

The potential for nonresponse bias to influence estimations of the probability of offering coverage is tested using a selection model. The likelihood of responding to the survey is estimated to be a probability of firm size, industry, and location. The selection equation is identified through the inclusion of mean commuting time in the county as a measure of the opportunity cost of time. When coverage is estimated in this manner, standard errors increase slightly reducing significance levels on some variables, but estimated coefficients do not change in sign or relative magnitude. Furthermore, the Wald test for independence of the selection and coverage equations generates a chi-square statistic of 1.25, not permitting rejection of the hypothesis that the results obtained are unbiased by the response rate.[6]

The individual regression on total compensation generated an adjusted R^2 value of .23, and the logistic model generated a pseudo-R^2 based on the log likelihood ratio of .42. Joint estimation using a nonlinear full information maximum likelihood estimator changed the fit values minimally.

Conditional on the firm offering coverage, the percentage of employees actually participating in offered coverage is estimated as a linear function of a

TABLE 3 Adjustments to Monthly Wages for Benefits Offered to Generate Total Compensation

	Value as % of Monthly Payroll
Retirement plan	3.5
Tax-deferred savings plan	1.6
Tuition assistance	0.1
Long-term disability insurance	0.1
Short-term disability insurance	0.2
Long-term care insurance	0.1
Life insurance	0.2
Child care assistance	0.1
Vacation	3.3
Holiday pay	2.2
Paid leave	1.0
Wages and salary as percentage total compensation—Bureau of Labor Statistics	72.6
Wages as percentage total compensation—Georgia data	80.1

vector of firm and employee characteristics and the interaction between rural status and firm size and wages.

RESULTS

Table 4 shows the estimated coefficients and significance levels for all variables from the jointly estimated model for total compensation and the probability that a firm offers health insurance. Results from the single equation estimations are available on request.

As expected, total compensation is an increasing function of firm size, increases with firm age, decreases significantly with the percentage of female employees, increases with the percentage of older workers, and is negatively affected by the percentage of workers with a tenure of less than 1 year. Multisite firms are associated with lower total compensation after controlling for all other variables. The observed differences in rural and urban total compensation are explained by the control variables included in the regression so that no residual rural effect is identified.

Coefficients estimating the effect of determinants on the probability of coverage suggest that the likelihood of offering coverage is increasing with firm size. For all industries, the propensity to offer coverage is lower than for the omitted public sector employers. Higher percentages of female employees

TABLE 4 Estimated Coefficients and Standard Errors from Joint Estimation of Compensation and Coverage Probability

	Linear Regression Total Compensation			*Logistic Regression Probability of Coverage*		
	Coefficient	SE		*Coefficient*	SE	
Intercept	7.330	0.314	***	–12.409	2.454	***
Firm size less than 10	–0.190	0.047	***	–2.630	0.323	***
Firm size 10 to 24	–0.020	0.044		–1.088	0.251	***
Firm size 100 or more	0.135	0.069	*	1.325	0.504	***
Omitted category firms size 25 to 99						
Agriculture/fishing industry	–0.052	0.175		–1.948	0.618	***
Construction industry	0.018	0.155		–2.323	0.596	***
Manufacturing	0.204	0.157		–1.067	0.585	*
Transportation	0.272	0.172		–1.957	0.676	***
Whole sale or retail trade	–0.004	0.147		–0.229	0.568	
Finance, insurance, real estate	0.524	0.155	***	–0.877	0.612	
Service industries	–0.081	0.153		–1.371	0.594	**
Professional services	0.346	0.148	**	–0.950	0.574	*
Omitted category public administration						
Firm age greater than 10	0.134	0.040	***	0.045	0.149	
Percentage female employees	–0.005	0.001	***	–0.017	0.003	***
Percentage employees < 25 years old	–0.001	0.001		–0.012	0.004	***
Percentage employees > 54 years old	0.002	0.001		0.000	0.004	
Percentage employees under 1 year tenure	–0.002	0.001	***	–0.011	0.003	***
Percentage employees 5+ years tenure	0.000	0.001		–0.012	0.002	***
County population density	0.000	0.000	***	NA	NA	
Adjuster for household buying power	0.000	0.000		NA	NA	
Percentage families in county below federal poverty level	0.010	0.008		NA	NA	
Average county household income	0.000	0.000		NA	NA	
Percent population with college degree	0.001	0.003		NA	NA	
Average hospital wage adjustment (CMS)	NA	NA		0.118	0.047	**
Physicians per thousand (county)	NA	NA		0.001	0.001	
County hospital beds	NA	NA		0.000	0.000	
Percentage workers earning < $9 per hour	NA	NA		–0.007	0.002	***

(continued)

TABLE 4 (continued)

	Linear Regression Total Compensation			*Logistic Regression Probability of Coverage*		
	Coefficient	SE		*Coefficient*	SE	
Omitted category public administration						
Percentage workers earning > $24 per hour	NA	NA		0.021	0.004	***
Employer offers retirement plan	NA	NA		1.403	0.171	***
Log of total compensation	NA	NA		1.673	0.254	***
Rural × Log of Total Compensation	NA	NA		1.509	0.348	***
Rural × Firm Size < 25	NA	NA		0.522	0.286	*
Multisite firm	–0.165	0.065	**	0.402	0.650	
Rural × % Employees > 54 years	0.002	0.001		0.000	0.001	
Rural × % Employees 5+ Years Tenure	–0.001	0.003		–0.002	0.003	
Rural × % Female Employees	0.000	0.001		0.016	0.004	***
Dummy for rural county	–0.098	0.088		–12.324	2.633	***
Dummy for Atlanta County	–0.089	0.077		0.456	0.435	

Note: CMS = Center for Medicare and Medicaid Services.

* Coefficient significant at $\alpha = .10$ level. ** Coefficient significant at $\alpha = .05$ level. *** Coefficient significant at $\alpha = .01$ level.

and employees with a tenure of less than 1 year are associated with a lower probability of offering coverage, although the effect of percentage females is limited to urban areas. Increasing total compensation is associated with an increased likelihood of offering coverage, as expected. That effect is stronger for rural firms than for urban firms. Although firm size appears to affect offer rates disproportionately for rural firms in the single-equation model, controlling for total compensation produces results that are only marginally significant for this variable.

There is a large and significantly negative coefficient for the likelihood of coverage for rural firms. This result implies that the propensity to offer coverage to rural workers is systematically lower than for urban workers and not captured by those differences in rural and urban firm and worker characteristics controlled for in the regression. This is tested by using the model to predict the likelihood of offering coverage for rural firms upon incremental changes in wages and firm size in isolation and in combination. The results are shown in Table 5.

TABLE 5 Predicted Probability of Offering Health Insurance with Incremental Changes to Wages and Firm Size (in percentages)

	Urban Firms	*Rural Firms*
Initial offer rates	67	53
Predicted offer rates with simulation		
Increase wages 20%	71	57
Increase wages 40%	73	61
Increase firm size by 20%	69	54
Jointly increase wages by 40% and firm size by 20%	74	62

Increasing wages for all firms by 20 percent would result in an increase in offer rates by 3 percentage points for firms within MSAs and 4 percentage points for rural firms (from 53 to 57 percent). An increase in wages of 40 percent, certainly more than would be required to approximate urban wages given the cost of living differences, only increases rural offer rates to 61 percent, still 7 points below the initial urban offer rates. Increasing firm size results in more modest incremental increases in predicted offer rates, and jointly increasing both firm size and wages is predicted to increase offer rates for rural firms by 9 percentage points. This is a substantial increase, but still significantly below the initial urban offer rate of 67 percent. Thus, unlike the results from Coburn et al. (1998), these results do not indicate that differences in rural and urban offer rates are fully attributable to firm size and differences in compensation.

The percentage of the workforce participating in coverage is estimated as a function of firm and workforce characteristics, along with interaction terms to identify marginal effects of wages and firm size for rural firms. Table 6 shows the estimated coefficients and significance levels for key study variables for the model estimating the determinants of participation rate conditional on being offered coverage.

The percentage of workers participating in coverage is negatively associated with all industries outside public administration. Older firms, firms with a greater percentage of older workers, and firms with a greater percentage of high-wage workers had higher participation rates in coverage. Participation was also positively associated with the offering of a retirement plan. High percentages of short-tenure (< 1 year) and long-tenure (> 5 years) workers was associated with lower participation rates.

Rural status had no independent effect on the participation rate of workers after controlling for worker characteristics and interactions with rural status.

TABLE 6 Estimated Parameters for Key Variables: Participation in Offered Coverage

Variable	*Parameter*	SE	*Significance*
Firm size less than 10	0.030	0.05	
Firm size 10 to 24	0.016	0.04	
Firm size 100 or more	–0.016	0.02	
Omitted category, firms size 25 to 99			
Agriculture/fishing industry	–0.290	0.11	***
Construction industry	–0.148	0.05	***
Manufacturing	–0.098	0.04	***
Transportation	–0.156	0.06	***
Wholesale or retail trade	–0.189	0.04	***
Finance, insurance, real estate	–0.223	0.04	***
Service industries	–0.231	0.05	***
Professional services	–0.259	0.04	***
Omitted category, public administration			
Firm age greater than 10	0.146	0.02	***
Percentage female employees	0.001	0.00	*
Percentage employees < 25 years old	0.001	0.00	
Percentage employees > 54 years old	0.003	0.00	***
Percentage employees less than 1 year of tenure	–0.002	0.00	***
Percentage employees 5 or more years of tenure	–0.001	0.00	***
Percentage workers earning < $9 per hour	0.000	0.00	
Percentage workers earning > $24 per hour	0.003	0.00	***
Employer offers retirement plan	0.103	0.02	***
Dummy for rural county	–0.515	0.40	
Log of wages	0.146	0.02	***
Rural * Log of Wages	0.088	0.05	*
Rural * Firm Size < 25	–0.184	0.07	***

* Coefficient significant at $\alpha = .10$ level. ** Coefficient significant at $\alpha = .05$ level. *** Coefficient significant at $\alpha = .01$ level.

Although firm size is generally very important in determining whether a firm offers coverage, the effect on participation is limited to rural firms, where the marginal effect of small size (< 25 employees) and rural status is negative and significant. This implies that for small firms in rural locations, participation rates are lower than for all other firms. Average wages have a significantly positive effect on the participation rate, and that effect is strongest for rural firms.

DISCUSSION

Differences in urban and rural firm compensation levels explain some but not all of the difference in offer rates for health insurance in Georgia. The residual difference between rural and urban firm propensity to offer health insurance is not fully explained by firm size differences or any other characteristic measured in this study. There are several plausible explanations for this difference.

- The supply of plans available to rural firms may be less than the supply of plan options available to urban firms.
- It is possible that public provision of services through community health centers, other subsidized sources, or private provider charity provisions affects demand for insurance differently in rural areas.
- There may be higher information costs associated with obtaining coverage for rural employers if the distribution system is different than in urban areas.

Each of these potential explanations merits additional study because they may imply policy options that could work to expand coverage among rural workers.

Conditional on working for a firm that offers health insurance, rural workers enroll at higher rates than their urban counterparts. For all workers, the likelihood of participating is increasing in wages, but wages have a marginally stronger effect on the likelihood of participating for rural workers. This also should be the subject of additional study because it implies that rural workers could respond differently to an individual cash incentive to participate in offered coverage than urban workers.

While the applicability of these specific results to other states may be limited, the implication of the analysis is that policy makers in each state must evaluate carefully the extent to which the characteristics of the local rural market differ from national norms. Local market characteristics may limit the applicability of national studies when evaluating policy at the state level. Given these results, other states may wish to examine their rural markets more closely before presuming that results obtained from national data necessarily apply to the rural markets in their state.

This study has demonstrated the importance of using a joint estimation approach for estimating the likelihood a firm will offer coverage as a function of compensation. While the estimated effect of compensation on coverage is not different in sign in the joint rather than single equation model, the magnitude of the coefficients is significantly different in the two equations. Uncontrolled endogeneity in estimating the single equation model understates the

effect of compensation on the probability of coverage for the general population by more than 50 percent.

LIMITATIONS

There are a variety of characteristics of firms and their workforce that may influence the propensity to offer health benefits but were not captured in the data used for this study. For example, although I ascertained the percentage of workers categorized as high- and low-wage and the mean worker wage, there may be other components of the distribution of wages across workers that determine whether or not a firm offers health insurance (e.g., the share of workers earning minimum wage). The share of workers classified as hourly rather than salaried and the share of nonpermanent workers are also likely to influence offer rates but were not included in this analysis. Furthermore, although every effort was made to test for selection bias, the lack of good instruments to control for this effect implies that the tests are somewhat inconclusive. Of particular concern was the lower response rate for Atlanta-based establishments compared to those in rural Georgia. These limitations imply that additional study of the differences in rural and urban employer behavior with respect to health insurance is necessary to adequately inform policy makers concerned with low rates of private coverage in some rural markets.

NOTES

1. Data from the 2000 Medical Expenditure Panel Survey (MEPS HC-039) and from the March Supplement to the Current Population Survey (2002).
2. The potential effect of coverage on increasing productivity is ignored for simplicity in this model. If, as shown by Gavin (1994), employers can expect an increase in productivity as a result of coverage, they may, in fact, bear some of the cost of coverage rather than shift that cost on to wages. In that case, employers are not indifferent to the composition of compensation and may bear some of the cost of coverage rather than substituting coverage for wages. However, the model would be unchanged with respect to that portion of the cost of coverage that is shifted on to wages or paid explicitly by employees in the form of a contribution.
3. The specification is tested for adequate identification of total compensation and wages by substituting wage for total compensation in the estimations. I obtain negative coefficients on wages, consistent with economic theory of wages substituting for benefits.
4. The firm-level data used for this study do not permit us to observe whether a worker opts to cover dependents, nor whether those refusing coverage are covered as a dependent by a family member. Thus, these data are not adequate to estimate the total percentage of the rural population covered by employment-based plans.

5. "Employment Cost Trends" from http://data.bls.gov/cgi-bin/dsrv.
6. Two additional tests for response bias were conducted. The probability of replying to the survey was included as a predictor variable in the coverage equation when estimating total compensation and coverage simultaneously. The estimated coefficient on this variable was not significantly different from zero, and its inclusion in the model did not alter the results. In addition, the simultaneous equation estimation was repeated on various subsamples of the data to determine if the inclusion of the multisite firms, largest firms, or Atlanta-based firms changed the primary results that rural firms were marginally more responsive to total compensation and that at the margin, firm size for rural firms was not a significant predictor of offer rates. In no case did the primary results change.

REFERENCES

Coburn, A. F., E. Kilbreth, S. H. Long, and M. S. Marquis. 1998. Urban-rural differences in employer-based health insurance coverage of workers. *Medical Care Research and Review* 55 (4): 484-96.

Coward, R. T., L. Clarke, and K. Seccombe. 1993. Predicting the receipt of employer-sponsored health insurance: The role of residence and other personal and workplace characteristics. *Journal of Rural Health* 9 (4): 281-92.

Current Population Survey. 2002. Washington, DC: Bureau of the Census.

Eeckhoudt, L., and C. Gollier. 1995. *Risk evaluation, management and sharing*. Hemel Hempstead, UK: Harvester Wheatsheaf.

Freeman, H. E., L. H. Aiken, R. J. Blendon, and C. R. Corey. 1990. Uninsured working age adults: Characteristics and consequences. *Health Services Research* 24 (6): 811-24.

Freeman, H. E., R. J. Blendon, L. H. Aiken, S. Sudman, C. F. Mullinix, and C. R. Corey. 1987. Americans report on their access to health care. *Health Affairs* 6 (1): 6-19.

Frenzen, P. D. 1993. Health insurance coverage in US urban and rural areas. *Journal of Rural Health* 9(3), 204-14.

Gavin, Norma. 1994. An empirical analysis of the provision of employer-sponsored health insurance. Ph.D. diss., Duke University.

Grossman, M. 1972. On the concept of health capital and the demand for health. *Journal of Political Economy* 80 (2): 223-55.

Long, S., and M. S. Marquis. 1994. The uninsured "access gap" and the cost of universal coverage. *Health Affairs* 13 (2): 211-20.

Medical Expenditure Panel Survey. 2000. *Full year population characteristics*. Rockville, MD: Agency for Healthcare Research and Quality.

National Center for Health Statistics. 2001. *Health, United States, 2001*. With urban and rural health chartbook. Hyattsville, MD: National Center for Health Statistics.

Ormund, B. S., S. Zuckerman, and A. Lhila, 2000. *Rural/urban differences in health care are not uniform across states*. Number B-11. Washington, DC: The Urban Institute. http://www.urban.org/url.cfm?ID=309533.

Pol, L. 2000. Health insurance in rural America. *RUPRI Center for Rural Health Policy Analysis* 5 (11): 1-10.

Spillman, B. 1992. The impact of being uninsured on utilization of basic health care services. *Inquiry* 29 (4): 457-67.

Variyam, J. N., and D. S. Kraybill. 1998. Fringe benefits provision by rural small businesses. *American Journal of Agricultural Economics* 80:360-68.