



Munich Personal RePEc Archive

## **Determinants of the Percent of the Population Enrolled in HMOs**

Alexander, Gigi and Cebula, Richard and Saadatmand,  
Yassamand

Jacksonville University, Jacksonville University, Armstrong Atlantic  
State University

3 December 2005

Online at <https://mpra.ub.uni-muenchen.de/51268/>  
MPRA Paper No. 51268, posted 13 Nov 2013 05:43 UTC

# Determinants of the Percent of the Population Enrolled in HMOs

Gigi M. Alexander, Dr. Richard J. Cebula, and Dr. Yassaman Saadatmand  
Armstrong Atlantic State University, Savannah, GA

## ABSTRACT

This study endeavors to identify key factors influencing interstate differentials in the percentage of the population enrolled in HMOs. Among other things, the cross-section analysis finds the percentage of a state's population enrolled in HMOs to be a decreasing function of the state's unemployment rate, the percent of the state's population at or below the poverty level, and the percentage of the population in the state that filed a federal personal income tax return that included a Schedule C (as a proxy for self employment and independent contractors). In addition, the study finds the percentage of a state's population enrolled in HMOs to be an increasing function of the percentage of the state's labor force that is unionized and the state's female labor force participation rate. The analysis also considers as additional explanatory variables the percent of the population that is black, the percent of the population that is Hispanic, and median family income. These variables do not appear to play a significant role in explaining HMO enrollments.

## INTRODUCTION

In the United States, the provision of healthcare and the workings of healthcare markets have attracted considerable interest in recent years. This interest covers a broad spectrum of topics, ranging from hospital capital costs to healthcare inflation to markets for healthcare coverage/insurance (Bursstin [1998-99], Cebula [2006], Chirikos [1998-99], Daniels and Gatsoni [1999], deMeza [1983], Dushi and Honig [2003], Frick and Bopp [2005], Gaynor and Haas-Wilson [1999], Glied [2003], Goodman and Stano [2000], Gruber [2003], Harris and Keane [1999], Holahan, Nichols, Blumberg, and Shen [2003], Jantzen and Loubenau [2003], Nyman [2003], Swartz [2003]). Of these issues, that of healthcare coverage/insurance has increasingly attracted the attention not only of the media but also of scholars across a variety of disciplines. Dushi and Honig [2003, p. 252] attribute this high level of interest to the fact that the "...decline in health insurance coverage over the last two decades is a matter of national concern." Indeed, Swartz [2003, p. 283] observes that "At least 41 million Americans are currently without health insurance (of any kind) in any given month..."

A very significant form of health insurance takes the form of Health Maintenance Organizations, HMOs. An HMO is defined as a prepaid health plan that delivers comprehensive healthcare to its members through designated providers, having a fixed periodic payment for health care services, and requiring members to be enrolled in a plan for a specified time period, typically one year. A group HMO delivers health services either through a physician group that is actually controlled by the HMO unit or, alternatively, the HMO unit contracts with one or more independent group practices to provide health services. An individual practice association (IPA) HMO contracts directly with physicians in independent practice and/or with one or more associations of physicians in independent practice and/or contracts with one or more multispecialty group practices (U.S. Census Bureau [2001, p. 101]).

The enrollment of the U.S. population in HMOs has grown dramatically since 1980. This is illustrated in Table 1 below. As shown, total enrollment in HMOs has grown from roughly 9.1 million Americans in the year 1980 to nearly 81 million in the year 2000. In alternative terms, total HMO enrollment increased by more than 790 percent over this 20 years span. This "phenomenon" of expansion makes HMO enrollment by far the fastest growing form of health care insurance in the United States. Arguably, this pattern could be attributable at least in part to the relatively lower direct costs of HMO "protection" versus that provided under other forms of health care insurance.

Table 1. HMO Enrollment, 1980-2000

Year/Enrollment in Millions	
1980	9.1
1990	33.0
1995	46.2
1999	81.3
2000	80.9

Source: U.S. Census Bureau [2001, Table 142].

Not only has HMO enrollment exploded in the last 20 or more years, but so also has the number of HMO plans. As shown in Table 2, the number of HMO plans nearly tripled between the years 1980 and 2000. The period of greatest proliferation was between the years 1980 and 1990. The number of plans seems to have peaked in 1999. Presumably, this proliferation of HMO plans makes the analysis of HMO policy all the more complex and the creation of potential "solutions" to the health care insurance issue all the more challenging.

Table 2. HMO Plans

Year/Number of Plans	
1980	235
1990	572
1995	550
1999	643
2000	568

Source: U.S. Census Bureau [2001, Table 142].

Given the magnitude and growth of HMO enrollment, as well as the diversity of HMO plans, insights into the determinants of HMO enrollment could be valuable to policymakers and others concerned with health care insurance reform. The present study seeks to add to this literature by identifying factors that determine interstate differentials in the percentage of the population enrolled in HMOs. This study begins with a simple model of the demand for healthcare-cost protection as provided by HMO enrollment. The study then empirically investigates the impacts of a variety of factors on the percentage of the population enrolled in HMOs, including the following: the percentage of the population that is unionized; the unemployment rate; the percentage of the population living at or below the poverty level; the percentage of the population that is at least partly self-employed (or independent contractors); and the female labor force participation rate. A number of additional factors that could potentially impact on HMO enrollment are also considered in a supplementary estimation.

#### A SIMPLE MODEL

In this eclectic demand-driven model, five factors are initially singled out, and accordingly five hypotheses are proffered. Based upon other studies, three additional variables are subsequently added to this basic model. Unlike the study of health care insurance *per se* undertaken by Frick and Bopp [2005], the present study does not include home ownership, age, or education variables. As a consequence, in the following (empirical) section of this study, two cross-section estimates for the 48 contiguous states are provided, with Alaska, Hawaii, and Washington, D.C. all treated as outliers.

To provide the reader insights into the geographic pattern of HMO enrollment, Table 3 provides the percent of the population enrolled in HMOs by state for the years 1990 and 2000. As shown, in both years, there is a wide variation across states in HMO enrollment patterns. It is observed that in 1990, 13.5 of the population was enrolled in HMOs, whereas that percentage rose dramatically by the year 2000 to 29.7 percent of the population (U.S. Census Bureau [2001, Table 143]). Interestingly, the states of Mississippi and Wyoming had essentially zero HMO enrollments in 1990 and experienced effectively no growth between 1990 and 2000, whereas Iowa and Vermont experienced actual decreases in HMO enrollment between 1990 and 2000.

To begin the analysis, it is hypothesized that the demand for healthcare-cost protection such as that provided by HMO enrollment is an increasing function of union membership (UNION), *ceteris paribus*, because the existence of labor unions has tended to raise the availability of employer-based group healthcare benefit plans, including HMOs [Dushi and Honig [2003, pp. 253, 255]. That is, historically, the provision of some form of employer-provided healthcare benefit has been a significant component of labor union-management contract negotiations. Therefore, the *higher* the percentage of the labor force in a state that is unionized, the *higher* the degree to which the population in the state will be enrolled in HMOs, *ceteris paribus*.

Next, the greater a family unit's "...ability to pay for insurance..." (Dushi and Honig [2003, p. 255], the greater the family unit's capacity to enroll in an HMO. In the present study, it is hypothesized that the higher the unemployment rate (UNR) in a state, the lower the capacity of households in the state to afford to pay HMO premiums and hence the smaller the percentage of the population in the state enrolled in HMOs, *ceteris paribus*. Of course, there are other income-related factors besides UNR that may influence the ability to pay HMO premiums. For example, if a family unit is living at or below the poverty level (POV), its capacity to pay HMO premiums will

be extremely limited. Accordingly, it is hypothesized that the percentage of a state's population enrolled in HMOs is a decreasing function of the percentage of the state's population living at or below the poverty level, *ceteris paribus*. The latter argument is consistent with the theoretical and empirical analysis found in the recent study by Frick and Bopp [2005].

Table 3. HMO Enrollment as a Percent of the Population

State	1990	2000
Alabama	5.3	7.2
Arizona	16.2	30.9
Arkansas	2.2	10.4
California	30.7	53.5
Colorado	20.0	39.5
Connecticut	19.9	44.6
Delaware	17.5	22.0
Florida	10.6	31.4
Georgia	4.8	17.4
Idaho	1.8	7.9
Illinois	12.6	21.0
Indiana	6.1	12.4
Iowa	10.1	7.4
Kansas	7.9	17.9
Kentucky	5.7	31.5
Louisiana	5.4	17.0
Maine	2.6	22.3
Maryland	14.2	43.9
Massachusetts	26.5	53.0
Michigan	15.2	27.1
Minnesota	16.4	29.9
Mississippi	0.1	1.1
Missouri	8.2	35.2
Montana	1.0	7.0
Nebraska	5.1	11.2
Nevada	8.5	23.5
New Hampshire	9.6	33.7
New Jersey	12.3	30.9
New Mexico	12.7	37.7
New York	15.1	35.8
North Carolina	4.8	17.8
North Dakota	1.7	2.5
Ohio	13.3	25.1
Oklahoma	5.5	14.7
Oregon	24.7	41.1
Pennsylvania	12.5	33.9
Rhode Island	20.6	38.1
South Carolina	1.9	9.9
Tennessee	3.3	6.7
Texas	3.7	33.0
Texas	6.9	18.5
Utah	13.9	35.3
Vermont	6.4	4.6
Virginia	6.1	18.5
Washington	14.6	15.2
West Virginia	3.9	10.3
Wisconsin	21.7	30.2
Wyoming	0.1	1.4

Source: U.S. Census Bureau [2001, Table 143].

In family units where persons are self-employed or "independent contractors," healthcare benefits typically do not accompany compensation received. Accordingly, in such cases, the family unit itself must pay the *full* cost of any HMO plan in which they choose to enroll. Moreover, as Swartz [2003, p. 283] observes, most of those who "...do not have access to employer-sponsored coverage...must purchase...in the non-group (individual) health-insurance market...where...insurance is typically twice as expensive as employer-group coverage..." In the present study, following the analysis and arguments found in Cebula [2006], in order to proxy the proportion of the population that can be characterized to at least some degree as self-employed or independent contractors, we adopt the variable SCHC, which is defined here as the percentage (in each state) of federal personal individual income tax returns which includes a "Schedule C." In turn, it is hypothesized here that the greater the value of SCHC in a state,

the smaller the percentage of the population in the state that will enroll in HMOs, *ceteris paribus*: as SCHC rises, the percentage of the population enrolling in HMOs declines because of the higher effective costs of HMO premiums for those who are self employed and independent contractors.

Finally, Dushi and Honig [2003, p. 253, Table 1] provide data on employer-based healthcare benefits. Although these data reveal that females in the labor force tend overall to have a smaller take-up rate than males in terms of healthcare benefit plans (who have an 88 percent average take-up rate), sometimes allegedly opting to simply rely on a spouse's healthcare plan, females in the workforce nevertheless do choose to take up a healthcare benefit option some 73 percent of the time *when such is offered/available to them*. Accordingly, it is hypothesized here that the *greater* the female labor force participation rate in a state (FLFPR), the *greater* the percentage of the population in the state enrolled in HMOs, *ceteris paribus*.

Based on the framework provided above, it follows that the percentage of a state's total population that is enrolled in HMOs (ENROLLHMO) is modeled, as follows:

$$\text{ENROLLHMO} = \beta_0 \text{UNION} + \beta_1 \text{UNR} + \beta_2 \text{POV} + \beta_3 \text{SCHC} + \beta_4 \text{FLFPR} + u \quad (1)$$

such that:  $\beta_{\text{UNION}} > 0$ ,  $\beta_{\text{UNR}} < 0$ ,  $\beta_{\text{POV}} < 0$ ,  $\beta_{\text{SCHC}} < 0$ ,  $\beta_{\text{FLFPR}} > 0$

#### \*<sup>4</sup>EMPIRICAL ANALYSIS

Based on the model outlined in equation (1), initially the following reduced-form model is to be estimated:

$$\text{ENROLLHMO}_j = \alpha_0 + \alpha_1 \text{UNION}_j + \alpha_2 \text{UNR}_j + \alpha_3 \text{POV}_j + \alpha_4 \text{SCHC}_j + \alpha_5 \text{FLFPR}_j + u \quad (2)$$

where:

ENROLLHMO<sub>j</sub> = the average percentage of the population in state j enrolled in HMOs, 2001;

$\alpha_0$  = constant;

UNION<sub>j</sub> = the average percentage of the labor force in state j that was unionized, 2000;

UNR<sub>j</sub> = the average percentage unemployment rate in state j in 2000;

POV<sub>j</sub> = the average percentage of family households in state j in 1999 identified as living at or below the federally defined poverty level;

SCHC<sub>j</sub> = the percentage of federal personal income tax returns filed in state j in 2001 (for tax year 2000) which included a Schedule C;

FLFPR<sub>j</sub> = the average female labor force participation rate in state j in 2000, as a percentage;

u = stochastic error term.

The data sources were, as follows: ENROLLHMO<sub>j</sub>, FLFPR<sub>j</sub>: U.S. Census Bureau [2002, Tables 143, 565]; UNR<sub>j</sub>, POV<sub>j</sub>, UNION<sub>j</sub>: U.S. Census Bureau [2001, Tables 606, 684, 639]; and SCHC<sub>j</sub>: IRS [2001, Table 3].

As observed by Frick and Bopp [2005, p. 456], who also deal with state-level data, a data set such as that considered in the present study almost surely is characterized by heteroskedasticity. In point of fact, formal testing reveals that in the present study, this was clearly the case. To address this problem, the standard White (1980) procedure is adopted. Accordingly, the OLS estimate provided in equation (2), which is provided in column (a) of Table 1, reflects the application of the White (1980) correction procedure.

In column (a) of Table 4, all five of the estimated coefficients exhibit the hypothesized signs, with four of the five being statistically significant at beyond the five percent level and one being statistically significant at beyond the ten percent level. The R<sup>2</sup> is 0.77, so that the model explains more than three-fourths of the variation in the dependent variable. The F-statistic is statistically significant at far beyond the one percent level, attesting to the overall strength of the model.

The estimated coefficient on the UNION variable is positive and statistically significant at the one percent level. Thus, there is strong empirical support for the hypothesis that the greater the percentage of the labor force in a state that is unionized, the greater the percentage of the state's total population that is enrolled in HMOs. This finding seemingly attests to the influence of unions in this arena. The coefficient on the UNR variable is negative, as hypothesized, and significant at beyond the five percent level. Apparently, then, the higher the unemployment rate in a state, the lower the percentage of the population in the state that is enrolled in HMOs, presumably because of a lowered ability to pay for same. The estimated coefficient on variable POV is negative, as expected, but significant at only the nine percent level. Thus, there is only modest empirical evidence in this estimate that this variable

reduces HMO enrollment. This result is weaker than the related finding in Frick and Bopp [2005]; nevertheless, it is arguably at least somewhat consistent with it. The estimated coefficient on the variable SCHC is negative, as expected, and significant at the one percent level. This finding would seem to suggest that the greater the degree to which a state's population is classified as self-employed or "independent contractors," the greater the extent to which that state's population may have to incur the *entire* cost of HMO premiums and hence the *lower* the degree to which that state's population enrolls in HMOs. This finding is entirely compatible with the findings in Cebula [2006], who found that the percentage of the total population *without* medical insurance as such was an increasing function of the percent of the population that was classified as independent contractors or as self-employed. Finally, the estimated coefficient on the FLFPR variable is positive and significant at beyond the one percent level. Hence, it appears that the greater the female labor force participation rate in a state, the greater the percentage of the state's population that enrolls in HMOs. Presumably, a higher female labor force participation rate increases HMO enrollments, possibly by increasing access to employer-provided HMO coverage.

The analysis thus far has ignored the possible impact, as suggested in the study by Dushi and Honig [2003, pp. 254-5] of race/ethnicity on the percent of the population enrolling in HMOs. Frick and Bopp [2005, p. 454] also argue that "...ethnic background...may affect the insurance decision process." Frick and Bopp [2005, p. 454] observe that "Some important decisions are influenced by family and cultural background." Swartz [2003, p. 283] observes that most of those without healthcare coverage "...have incomes below \$35,000..." In point of fact, the median incomes for Hispanics and blacks are not only both below \$35,000 but also only 61.8 percent and 62 percent, respectively, of the median income of whites (U.S. Census Bureau [2001, Table 37]). These circumstances suggest the propriety of integrating the percent of a state's population that is Hispanic (PCTHISPANIC<sub>j</sub>) and the percent of a state's population that is black (PCTBLACK<sub>j</sub>) into the model, with the hypotheses being that the percent of the population in state *j* enrolled in HMOs is an *decreasing* function of PCTHISPANIC<sub>j</sub> on the one hand and a *decreasing* function of PCTBLACK<sub>j</sub> on the other hand, *ceteris paribus*. Including these two variables parallels the study by Frick and Bopp [2005], who introduce "...two ethnicity variables, one that measures the percent of a state's population of recent African heritage and one that measures the percent that is of Hispanic origin." The data source for variables PCTHISPANIC<sub>j</sub> and PCTBLACK<sub>j</sub> for the year 2000 is the U.S. Census Bureau [2001, Table 23].

Table 4. OLS Estimations: Dependent Variable: ENROLLHMO

Variable/Estimate	(a)	(b)
Constant	35.69	42.01
UNION	+0.30	+0.32
	(+4.61)	(+4.24)
UNR	-1.26	-1.48
	(-2.04)	(-2.33)
POV	-0.348	-0.45
	(-1.78)	(-2.06)
PCTSCHC	-0.015	-0.013
	(-3.24)	(-3.08)
FLFPR	+1.21	+1.19
	(+5.04)	(+4.93)
PCTHISPANIC		-0.016
		(-0.48)
PCTBLACK		+0.041
		(+1.23)
MFI		-0.000001
		(-0.87)
R <sup>2</sup>	0.77	0.79
Adj R <sup>2</sup>	0.74	0.74
F	27.59	18.14

In addition, it may be that purely economic variables reflecting the ability to pay HMO premiums are not adequately reflected in the variables UNR and POV. Accordingly, the variable MFI, the median family income in state *j* in 1999, is also included in the expanded model specification, with the expectation being that this variable would exercise a positive impact on HMO enrollment, *ceteris paribus*. The data source for this variable is the U.S. Census Bureau [2001, Table 667].

In column (b) of Table 4, the OLS (White [1980] heteroskedasticity-corrected) results from estimating equation (2) with the three additional variables noted above included in the specification are provided. As shown, six of the eight estimated coefficients exhibit the expected signs, with five of these six being statistically significant at beyond the five percent level. In addition, the R<sup>2</sup> is 0.79, so that the model appears to explain roughly four-fifths of the variation in the dependent variable. The F-statistic is significant at far beyond the one percent level. Note, however, that the adjusted R<sup>2</sup> in column (b) is not observably

different from that in the estimate found in column (a). This result presumably reflects the statistical finding that none of the three additional variables introduced into the original specification, namely PCTHISPANIC, PCTBLACK, and MFI, is statistically significant at even the ten percent level. These particular results are fairly similar to those obtained by Frick and Bopp [2005], p. 457].

On the other hand, within the specification summarized in column (b), the POV variable not only now exhibits the hypothesized negative sign (as it did in the original estimate) but also is now significant at beyond the five percent level rather than merely at the nine percent level. Hence, the percent of state  $j$ 's population enrolled in HMOs is found to be a decreasing function of  $POV_j$ , as well as  $SCHC_j$  and  $UNR_j$ , and an increasing function of both  $UNION_j$  and  $FLFP_j$ . The finding for the variable reflecting independent contractors and the self employed,  $SCHC$ , is entirely consistent with that found by Cebula [2006].

#### CONCLUSION

The issue of health care insurance has received broad attention in recent years. The single largest form of such coverage in reflected in the enrollment of the public in Health Maintenance Organizations, HMOs. This empirical study has sought to identify key determinants of interstate differentials in the percentage of the population enrolled in HMOs. The OLS results find the percentage of a state's population enrolled in HMOs to be an increasing function of both the percentage of the labor force in the state that was unionized and the female labor force participation rate in the state. In addition, the results find the percentage of a state's population enrolled in HMOs to be a decreasing function of the unemployment rate in the state, the percentage of the state's population living at or below the poverty level, and the percentage of federal personal income tax returns filed in the state that included a Schedule C (as a proxy for self employed and independent contractors). Interestingly, a theme that seemingly runs through all five of these variables is that of either the *affordability* of HMO premiums and/or access to HMO coverage.

The identification of key factors influencing the percentage of the population enrolled in HMOs suggests other research opportunities. Further research is warranted to meaningfully address emerging issues in HMO participation rates. Future studies into HMO participation may include the following considerations: children, disabled adults, and newly developed federal/state Medicaid HMO plans. Empirical research involving these variables may yield valuable insight into the determinants of HMO enrollment; moreover, such research may help to create a foundation for future policy development to improve the quantity of healthcare and the quality of healthcare delivery.

#### Notes:

1. This hypothesized relationship assumes that HMO enrollment is a "normal good."
2. These conclusions are unchanged if median family income (MFI) is replaced by either per capita income or per capita disposable income. Furthermore, introduction of a variable to reflect the average cost of living in each state for a four-person family, also does not materially alter the conclusions.

#### REFERENCES

- Bustin, H.R. (1998-99). "The Effect of Change of Health Insurance on Access to Care," *Inquiry*, Vol. 35, 389-397.
- Cebula, R.J. (2006). "Determinants of Interstate Differences in the Percent of the Population without Health Insurance: The Impact of Independent Contractors and the Self Employed," *International Advances in Economic Research*, Vol. 22, 101-109.
- Chirkov, T.N. (1998-99). "Further Evidence That Hospital Production is Inefficient," *Inquiry*, Vol. 35, 408-416.
- Daniels, M.I., and Gatsonis, C. (1999). "Hierarchical Generalized Linear Models in the Analysis of Variations in Health Care Utilization," *Journal of the American Statistical Association*, Vol. 94, 29-42.
- DeMeza, D. (1983). "Health Insurance and the Demand for Medical Care," *Journal of Health Economics*, Vol. 2, 47-54.
- Dush, L., and Homig, M. (2003). "Price and Spouse's Coverage in Employee Demand for Health Insurance," *American Economic Review Papers and Proceedings*, Vol. 93, 252-256.
- Frick, K., and Bopp, A. (2005). "Poverty: Insurance Theory and the Medically Uninsured," *Atlantic Economic Journal*, Vol. 33, 451-459.
- Gaynor, M., and Hass-Wilson, D. (1999). "Change, Consolidation, and Competition in Health Care Markets," *Journal of Economic Perspectives*, Vol. 13, 141-164.
- Glied, S. (2003). "Health Care Costs: On the Rise Again," *Journal of Economic Perspectives*, Vol. 17, 125-148.
- Goodman, A.C., and Stano, M. (2000). "HMOs and Health Externalities: A Local Public Good Perspective," *Public Finance Review*, Vol. 28, 247-269.
- Gruher, J. (2003). "Evaluating Alternative Approaches to Incremental Health-Insurance Expansion," *American Economic Review Papers and Proceedings*, Vol. 93, 271-276.
- Harris, K.M., and Keane, M.P. (1999). "A Model of Health Plan Choice: Inferring Preferences and Perceptions from a Combination of Revealed Preference and Attitudinal Data," *Journal of Econometrics*, Vol. 89, 131-157.
- Holahan, J., Nichols, L.M., Blumberg, L.J., and Shen, Y.-C. (2003). "A New Approach to Risk-Spreading via Coverage-Expansion Subsidies," *American Economic Review Papers and Proceedings*, Vol. 69, 277-282.
- Internal Revenue Service. (2001). *IRS Data Book*. Washington, D.C.: U.S. Government Printing Office, 2001.
- Janzsen, R., and Loubeau, P.R. (2003). "Managed Care and U.S. Hospitals' Capital Costs," *International Advances in Economic Research*, Vol. 9, 206-217.
- Nyman, J. (2003). *The Demand for Health Insurance*. Stanford: Stanford University Press.
- Swartz, K. (2003). "Reinsuring Risk to Increase Access to Health Insurance," *American Economic Review Papers and Proceedings*, Vol. 69, 283-287.
- U.S. Census Bureau. (2001). *Statistical Abstract of the United States 2001*. Washington, D.C.: U.S. Government Printing Office.
- U.S. Census Bureau. (2002). *Statistical Abstract of the United States 2002*. Washington, D.C.: U.S. Government Printing Office.
- White, H. (1980). "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica*, Vol. 48, 817-838.