

# Duplicate Health Insurance Coverage: Determinants of Variation Across States

by Harold S. Luft and Susan C. Maerki

*Although it is recognized that many people have duplicate private health insurance coverage, either through separate purchase or as health benefits in multi-earner families, there has been little analysis of the factors determining duplicate coverage rates. A new data source, the Survey of Income and Education, offers a comparison with the only previous source of state level data, the estimates from the Health Insurance Association of America. The  $R^2$  between the two sets is only .3 and certain problems can be traced to the methodology underlying the HIAA figures.*

*Using figures for gross and net coverage, the ratio of total policies to people with private coverage ranges from .94 in Utah to 1.53 in Illinois. Measures of industry distribution, per capita income and employment explain a large portion of the variance, but it appears that these factors operate in opposite directions for group and non-group policies. Similar socio-demographic variables also explain net coverage. These findings have substantial implications for research and the structuring of employee health benefits.*

## Introduction

In the early days of health insurance, coverage under multiple policies was a source of concern to the industry because some people collected more than their expenditures and therefore "made money" by being hospitalized (Andersen and Riedel, 1967; Ferber, 1966; Luck, 1963). With the development of coordination-of-benefits clauses and the dominance of group enrollment, the inappropriate incentives to consume medical care because of duplicate coverage, or "overinsurance," have become less of an issue. However, duplicate coverage continues to exist and its

This research has been supported by grant 18-P-97556/9-01 from the Health Care Financing Administration.

presence has important implications beyond the issue of "overinsurance," both for public policy and for research on the medical care system.<sup>1</sup>

<sup>1</sup>Luck distinguishes between "multiple coverage," "duplicate coverage," and "overinsurance."

... *multiple coverage* refers to coverage for the same or different services by more than one contract when the contracts are explicitly intended to supplement one another in terms of either services or benefits ... *Duplicate coverage* takes place when coverage is provided by more than one contract for the same service, usually a major category of service, e.g., hospital care or physician's services. Multiple coverage, and more especially duplicate coverage, may result in *overinsurance*, defined here as the receipt of benefits exceeding 100 percent of the total charges ...

For our purposes, multiple and duplicate insurance will be used interchangeably because we are referring to the statistics on hospitalization insurance. Most major policies provide a similar range of benefits for hospitalization, and coverage by more than one contract is almost sure to provide duplicate coverage. Furthermore, our primary concern is with the use of enrollment data for the analysis of hospital utilization, rather than for the allocation of expenditures or benefits. If plans offering only partial coverage because of exclusions or coordination of benefits counted enrollees in proportion to their coverage, much of our concern would disappear.

Coverage by more than one policy occurs in a number of situations.

- The most frequent example, recognized in the earliest studies of the issue (Andersen and Riedel, 1967; Ferber, 1966; Luck, 1963), occurs when two or more people in the family are working and at least one of them has family coverage.
- Others purchase additional policies outside of the employer group, policies termed individual or non-group contracts, to supplement the primary policy.<sup>2</sup> Some may purchase more than one non-group policy.
- Less often, multiple coverage results when a person has more than one job, or during the period when continuation of benefits from a former employer overlaps with the coverage obtained from a new employer.
- Administrative "phantom coverage" appears when the statistics maintained by the carrier indicate that the total number of people enrolled in the plan exceed the number actually eligible. Lags in tabulating employee turnover and inaccurate estimates of family size on family contracts are two sources of this phantom coverage. It should be noted that such phantom coverage implies the appearance, rather than the reality of duplicate coverage, and it is difficult and very costly to maintain accurate figures on enrollment.
- Various changes in the occupational mix, employee fringe benefits, family structure, and labor force participation of married women have resulted in a substantial increase in duplicate coverage over the last decade (Luft, 1981).

Temporal changes in duplicate coverage raise one set of issues and problems, but another set arises from the recognition that multiple insurance policies are not randomly distributed across the population. There are important geographic, occupational, and demographic factors that influence the extent of duplicate coverage. Recognition of these factors has direct policy relevance and substantial implications for researchers using estimates of health insurance coverage.

This paper is not intended to be a comprehensive analysis of the duplicate coverage issue. It is an outgrowth of a study that required estimates of hospitalization insurance coverage by state as one of many independent variables (Luft, 1979). In the process of examining these data, numerical inconsistencies and methodological problems led to an examination of duplicate health insurance coverage. The apparent ramifications of the issue extend well beyond the original research project.

<sup>2</sup>To avoid the confusing term "individual policy," we will refer to single and family policies that may be obtained either through group or non-group purchasing arrangements.

The first section of this paper discusses alternative estimates of gross and net insurance coverage and the derivation of the duplicate coverage figures. The second section offers an initial exploration of factors that may explain variations across states in the duplicate coverage rate, although much more work beyond the scope of this paper must be done to understand the complexities of duplicate coverage. In the third section, we focus on estimating net health insurance coverage by state as a function of other readily available factors. This allows us to generate a consistent set of net health insurance coverage data for the period 1953-76. The final two sections address implications for research and for policy.

### **Alternate Estimates of Health Insurance Coverage**

Duplicate coverage rates involve a denominator which is the number of people covered by insurance, or net enrollment, and a numerator which represents duplication. For analytic studies of why people have multiple policies, the numerator would be the number of people with two, three, or more policies covering them. For aggregate studies of utilization, an alternative measure is a numerator that is gross enrollment, the total number of enrollees in all health insurance plans, without any adjustment for duplication. Our current interest in utilization statistics and the limited availability of data restrict this paper to an analysis of the latter measure, the ratio of gross to net enrollment.

#### **Gross Enrollment**

Gross enrollment data may be obtained in two ways: (1) from household surveys that ask people whether they are covered, and exactly how many policies they hold; and (2) from enrollment reports of insurance carriers and health plans. Although the federal government and many researchers have used survey results for many years, one of the major criticisms of such data is that people may underreport coverage (Reed, 1965). It is even more likely they will underreport the number of multiple policies. Moreover, surveys are expensive to mount and rarely provide data for areas smaller than major Census regions. Gross enrollment statistics from insurance carriers, however, are compiled regularly by the Health Insurance Association of America (HIAA) using data from commercial insurance companies, Blue Cross and Blue Shield, and the Department of Health and Human Services estimates of enrollment in HMOs and other independent plans. Adjustments to these statistics serve as the basis for the HIAA estimates of net coverage by state, which have been published since 1948. (See annual issues of *Source Book of Health Insurance Data* published by the Health Insurance Institute for HIAA.)

## Net Enrollment

Because net enrollment statistics must identify those people with coverage, regardless of the number of policies, survey data are often preferred even though there is potential underreporting.<sup>3</sup> Household-based estimates of the covered population have been developed at irregular intervals since the early 1950s (Andersen and Anderson, 1967; Anderson and Feldman, 1956; Anderson, Collette, and Feldman, 1963; Andersen, Lion, and Anderson, 1976; Kovar, 1960; U.S. Bureau of the Census, 1978; U.S. National Center for Health Statistics (NCHS), 1965; U.S. NCHS, 1972; U.S. NCHS, 1976; U.S. NCHS, 1977; U.S. NCHS, 1979). With the exception of the 1976 Survey of Income and Education, these surveys do not provide coverage estimates at the state level, but only at the four major Census regions (U.S. Bureau of the Census, 1978).<sup>4</sup>

The Health Insurance Association of America derives estimates of net coverage based on its gross enrollment statistics. (This derivation is described in the next section.) These are the only state data available over an extended period of time. Thus, they have been used in numerous analytic studies, many of which have had a substantial impact on our views of the medical care system (Feldstein, 1971; Feldstein and Taylor, 1977; Fuchs and Kramer, 1972; Goldberg and Greenberg, 1977; Rosenthal, 1964). However, our current analysis raises serious questions about the validity of the HIAA net enrollment data.

### From Gross to Net Enrollment

The first and most important problem with the data stems from the methods used by the HIAA to derive net coverage from gross enrollment. National and state totals for gross coverage are calculated for each category of insurance—Commercial Group; Commercial Individual (or non-group); Blue Cross/Blue Shield; and Other (which includes prepaid plans). Each of these are then multiplied by a separate duplicate coverage factor estimated from a periodic one-day survey of insurance claims.<sup>5</sup> Even when taken at face value, these must be regarded cautiously because subscribers submitting claims may not represent the entire insured population. If a sample of claimants is older or sicker and over-representative of individuals who purchase additional coverage in anticipation of higher utilization, the factor will overestimate duplicate coverage. Conversely, an individual with multiple policies

<sup>3</sup>One may argue, however, that if people really do not know they have coverage, their behavior is not influenced by potential, but unused insurance benefits.

<sup>4</sup>The National Health Interview Survey data tape can be used to provide coverage rates for selected metropolitan areas.

<sup>5</sup>The current factors are based on a 1973 survey. Group surveys were also conducted in 1967 and 1977, and these do not suggest a need for changes from the factors based on the 1973 survey (Thexton, 1981).

might stagger submitting claims to reduce the likelihood that the other insurance company will discover the duplication and coordinate payments. When payments are made directly to the subscriber rather than to the physician or hospital, total payments would cover a larger proportion of the total bill or may even produce a "profit".<sup>6</sup> Potential double payments create an incentive to understate multiple coverage on claims forms, and this will reduce the estimated duplicate coverage rate. In recognition of these potential biases, the HIAA adds an upward adjustment to the duplicate coverage estimates derived from the sample survey.

The final HIAA national estimates of net enrollment derived from this process are consistently above those of survey estimates. It is clear that the respective methodologies bias up the HIAA figures and bias down the survey figures, and the true figure is between these two (Anderson and Feldman, 1965; Carroll, 1978; Reed, 1965). It should be noted, however, that when the HIAA has revised its estimates, it has been usually downward, which suggests that the survey figures are probably more accurate (Luft, 1981; Reed, 1967). Although we will use survey estimates as our benchmark for net coverage, it is a trivial matter to adjust them to whatever alternative data one feels is more appropriate.

The major difficulty with the HIAA procedure occurs in the estimation of net enrollment at a state level. The net coverage multipliers developed at a national level are applied to the gross enrollments by type of coverage in each state. For instance, in recent years the national equation has been:

$$\text{Net Enrollment} = (0.85 \times \text{Commercial Group}) + (0.40 \times \text{Commercial Nongroup}) + (0.95 \times \text{BC/BS}) + (0.99 \times \text{Other})$$

This implies that only 40% of commercial non-group policies are nonduplicative and represent uncovered people. Applying the same set of coefficients to all states ignores the fact that some states may have low rates of group enrollment, with non-group policies as the major source of coverage, while other states have high rates of group enrollment, so non-group coverage is almost always duplicative. Unfortunately, without an independent source of coverage data at the state level, such as the Survey of Income and Education (SIE), there was no way that the HIAA or an independent researcher could determine the extent of this problem. Our comparison indicates, based on the SIE data, major discrepancies attributable to the HIAA procedure. Even without the SIE data, it is clear that the assumption of uniform duplication rates across states is incorrect because the procedure results in net estimates that exceed several states' population.

<sup>6</sup>Studies in the 1960s indicated this to be a problem among those with multiple policies (Ferber, 1966). Coordination of benefits among insurers has improved, and it is less likely now that a person with more than one policy will receive an overpayment.

## Employment vs. Residence-Based Data

This leads to consideration of the second major problem: the likelihood that the data refer to place of employment rather than place of residence. Since the gross coverage data are obtained from carriers, rather than enrollees, it is almost certain that statistics for persons with group coverage are reported by the location of the group, i.e., the employer, and that coverage for persons with non-group policies reflect residence. Until the 1973 report, the HIAA state coverage figures identified the data as employment-based. From 1974 to 1978 the footnote indicates the "estimated distribution by states reflects coverage by residence rather than employment." The 1978-79 handbook correctly identifies the data as an "estimated distribution by states [which] essentially reflects coverage by employment rather than residence with adjustment to take into account the population of the states." In fact, the only major change in methods occurred in 1973 when it was recognized that, for some states, the estimated number of persons under age 65 with private insurance exceeded the under age 65 population. Although this had long been the case for Washington, D.C., the role of commuters from Maryland and Virginia was assumed to explain the discrepancy. The HIAA took the stance that their national estimates of net enrollment were correct, necessitating reallocation of the state estimates. The current procedure compares the estimated net enrollment in each state to the civilian non-institutionalized under age 65 population in that state. If net enrollment exceeds 98 percent of the relevant population, the estimate is arbitrarily set at the 98 percent value. The residual is reallocated among those states with less than 98 percent coverage in proportion to their enrollment. Thus, 9.3 percent of the excess coverage in Massachusetts is reallocated to California. Several passes are often required before all states fall at or below the "98 percent limit." The use of an arbitrary upper limit is questionable, and the reallocation to all states, rather than neighboring states, which might reflect commuting patterns, compounds the problem. Unfortunately, the HIAA has not had any better data from which to make its adjustments.

While there are severe problems with the HIAA net coverage figures, the gross enrollment data are reasonably accurate, with one important exception. The exception stems from the fact that the group enrollment reflects place of employment rather than residence. Since residence-based data are more useful

for most analytic purposes, we reallocated the group enrollment data from place of employment to place of residence. Group enrollment, in this case, refers to commercial group coverage, group coverage under Blue Cross/Blue Shield/medical society plans, and "Other Plans," such as HMO's, union, and employer-employee plans.<sup>7</sup> The reallocation was accomplished by using a commute-to-work matrix developed by the Bureau of Economic Analysis of the U.S. Department of Commerce (1979). This 51 by 51 matrix indicating the number of people by state of residence and state of employment was developed by matching employer-based FICA tax returns with the place of residence listed on individual income tax returns. Not surprisingly, most people live and work in the same state, and out-of-state commuting is much more prevalent in the Northeast than in the West.<sup>8</sup>

Non-group enrollments were not reallocated on the assumption that most of these policies would be reported from the place of residence. The sum of the HIAA non-group and the reallocated group enrollments yield an estimate of residence-based gross enrollment.

## Comparing HIAA and Survey Estimates of Net Coverage by State

Because most people live and work in the same state, the residence-based gross enrollments are similar to the raw figures provided by the HIAA. (The  $R^2$  between the two sets of data, in terms of policies/capita, is .966.) Given this result can we assume that the HIAA net figures are also close to the mark? Unfortunately, this is not a correct assumption.

The 1976 Survey of Income and Education is a household survey of sufficiently large magnitude to provide reasonably reliable state estimate data, including health insurance coverage (U.S. Bureau of the

<sup>7</sup>These data were provided by the HIAA. The annual sourcebooks only include net enrollments by state after application of the "98 percent rule" rather than gross enrollments by type of coverage. All our data refer to hospital insurance coverage. Group coverage for Blue Cross/Blue Shield plans was drawn from the 1977 Blue Cross-Blue Shield Fact Book and personal correspondence with those Blue Shield plans providing both hospital and medical coverage.

<sup>8</sup>Although the matrix is conceptually 51 x 51, the Dept. of Commerce only makes available a table showing up to ten states of employment for each state of residence with all other "commuters" lumped together. In no case was the "other" category more than 0.5 percent.

Census, 1979). We have used the figures for persons under the age of 65 who are covered by one or more private health insurance plans. Those who were covered under both private and public plans are included.<sup>9</sup> People with public coverage only were excluded.<sup>10</sup> Overall, the SIE indicates that 75 percent of the under 65 population had private coverage, a figure close to those reported by other surveys for the same period (U.S. NCHS, 1979; Robert Wood Johnson Foundation, 1978). The potential undercounting bias in surveys exists in the SIE, but there is no reason to think it would have differential impacts across states.

Figure 1 presents a plot of the proportion of the civilian population under age 65 with coverage as based on the SIE and the HIAA net enrollment figures. A scatter of points along the 45° line would indicate close agreement between the two sources. Alternatively, the points might fall along a line above or below the diagonal, indicating consistent under or over estimation by the SIE. Instead, the points create a diffuse "cloud," and the regression of HIAA coverage on SIE yields an  $R^2$  of only .3. Part of these distressing results are directly attributable to the 98 percent rule, as can be seen by the line of states at the 98 percent coverage level. More importantly, this discrepancy is evidence that duplicate coverage is not uniform across states.

An easy solution for someone requiring estimates of the covered population by state in 1976 is to use the SIE rather than the HIAA figures. For those interested in earlier periods, however, state-specific survey data are not available; nor, considering the cost of such surveys, is the SIE likely to be repeated often. The development of an approach for estimating net coverage by state as a function of other, more readily available data, is presented later in the paper. Recognizing that duplicate coverage varies across states raises the question: Is it possible to explain why such variation occurs?

<sup>9</sup>The vast majority of people with both public and private coverage are 65 and over. For the under 65 population, those with both public and private coverage total 3 percent of the population with private coverage. The SIE question referred to health insurance plans "designed to pay all or part of the hospital, and/or doctor, surgeon or other medical expenses." It specifically excludes accident and disability income insurance (U.S. Bureau of the Census, 1976).

<sup>10</sup>Public coverage includes Medicaid, Medicare, Veterans Administration and coverage by the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) for civilian dependents of members of the Armed Forces.

## State Variations in the Duplicate Coverage Rate

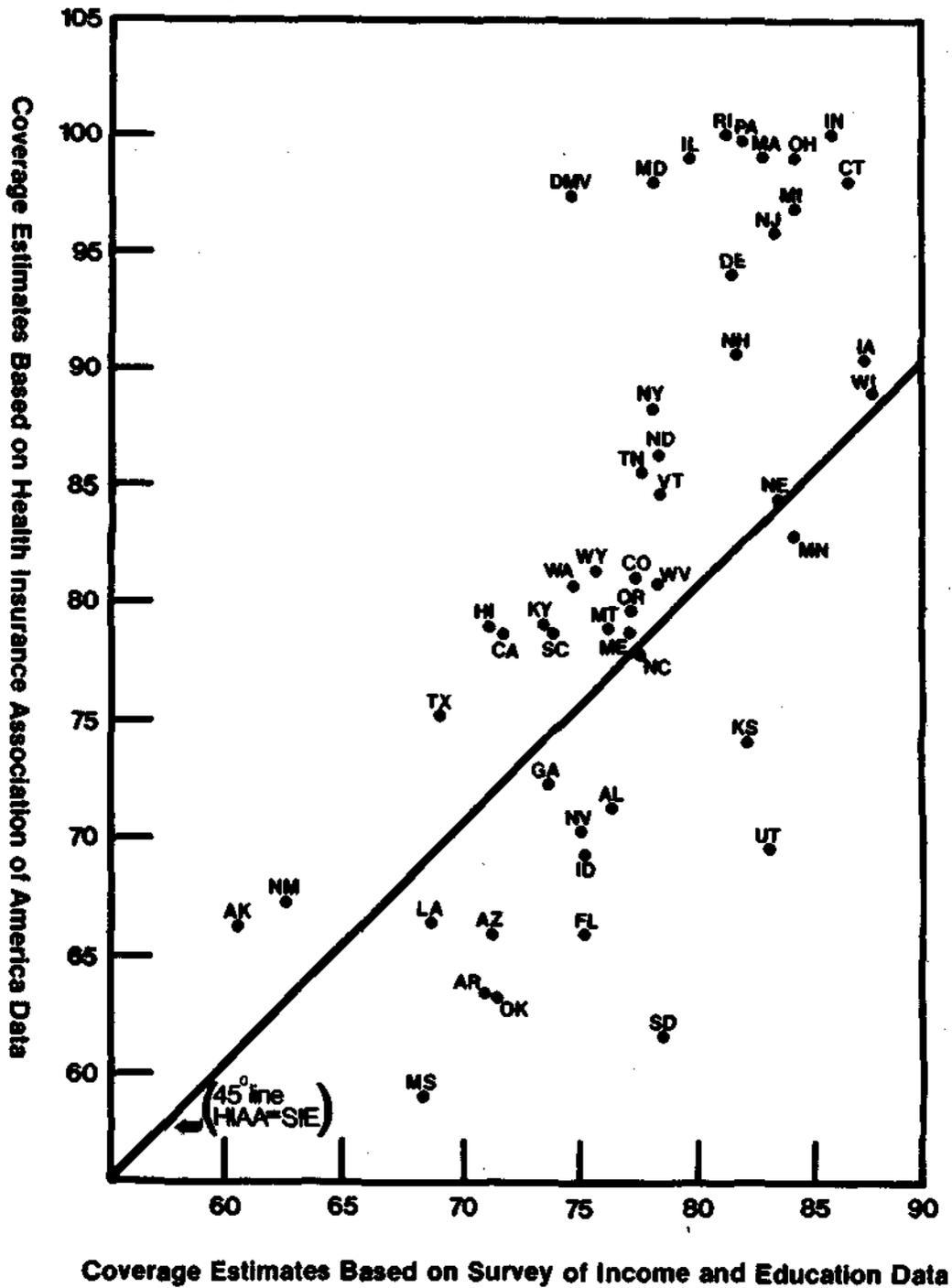
Table 1 presents estimates of per capita coverage using HIAA gross, HIAA net and SIE net divided by the civilian under 65 population and the group, non-group and overall duplication rate, which is defined as the relevant gross HIAA coverage divided by SIE.<sup>11</sup> These figures indicate an overall duplicate coverage rate of 1.23, ranging from .94 in Utah to 1.53 in Illinois. In fact, Utah is the only state in which the survey estimate exceeds the HIAA estimate and this may reflect either random sampling error or the omission of one or two carriers whose business is concentrated in Utah.

Several factors are likely to influence the duplicate coverage rate. Since most health insurance is obtained through employment groups, duplication is probably dependent on the likelihood that several workers in a family have group coverage through employment and cover each other and their children. Clearly, the duplication rate should be positively related to the number of workers in a family. Employment-based coverage is also more likely for people in unions and union plans typically have more comprehensive benefits. Those who work full time are more likely to have coverage than part-time workers. There are also marked differences in private health insurance coverage by industry, ranging from 94 percent in durable manufacturing to 74 percent in personal services (Congressional Budget Office, 1979). Finally, employer contributions for coverage of dependents also vary by industry and income.<sup>12</sup> The larger the employer contribution, the greater the likelihood that everyone in the family is automatically covered and that additional earners result in duplication. Clearly, many of these factors are interrelated and a multiple regression model is necessary to estimate their net effects on duplication.

<sup>11</sup>Theoretically, a distinction exists between additional health insurance policies which provide benefits to supplement services or payments included in the primary plan and additional policies which provide similar or overlapping benefits. Without the detailed examination of plan benefits such as provided by the National Medical Care Expenditure Survey (forthcoming), we cannot distinguish types of duplication and thus must rely on the ratio of gross to net enrollments. One may also define the duplication rate in other ways, such as the ratio of (gross-net enrollment)/net enrollment. Because our primary interest was in a ratio to adjust existing enrollment statistics, we chose to use gross/net enrollment.

<sup>12</sup>The exclusion of fringe benefits from taxable income makes employer contributions for health insurance more valuable as income rises. For example, see the discussion in Greene (1980), Mitchell and Vogel (1975) or Steurle and Hoffman (1979).

**FIGURE 1**  
**Percentage of Each State's Population Under Age 65**  
**with Private Insurance — 1976**



**TABLE 1**  
**Values of the Health Insurance Coverage Estimates Used in the Analysis**

State	GRSPC65	HIAAPC65	SIEPC65	GRPDRT	NGRPDRT	PRVTDRT
AL	.85870	0.71127	0.767728	0.91350	0.204993	1.11849
AK	.64912	0.65915	0.604261	1.00373	0.070510	1.07424
AR	.75296	0.63132	0.712561	0.80865	0.248016	1.05667
AZ	.70258	0.65606	0.715209	0.92225	0.175817	1.09807
CA	.87159	0.78603	0.719428	1.12198	0.089418	1.21150
CO	.92991	0.80993	0.778871	1.03376	0.160148	1.19391
CT	1.17499	0.98051	0.867809	1.22674	0.127251	1.35399
DE	.99792	0.94906	0.817925	1.12544	0.094579	1.22002
FL	.81497	0.65595	0.754816	0.80872	0.270974	1.07969
GA	.84895	0.71967	0.741202	1.02356	0.121814	1.14538
HI	.82282	0.78762	0.715898	1.07815	0.071199	1.14935
ID	.86915	0.69016	0.756649	0.88682	0.261863	1.14869
IL	1.22758	0.99082	0.801507	1.27680	0.254785	1.53158
IN	1.18987	1.00461	0.861593	1.25545	0.125554	1.38101
IA	1.07162	0.90259	0.876248	0.93274	0.290205	1.22295
KS	.91453	0.73831	0.822488	0.91231	0.199613	1.11192
KY	.92312	0.78772	0.739647	1.05336	0.194719	1.24808
LA	.79401	0.65966	0.688807	0.90938	0.243339	1.15272
ME	.87479	0.78602	0.776165	0.91550	0.211546	1.12705
MA	1.06862	0.99198	0.831905	1.16744	0.117102	1.28454
MI	1.06542	0.96751	0.846920	1.15276	0.105241	1.25800
MN	.98751	0.82777	0.844368	0.95711	0.212414	1.16952
MS	.76268	0.58405	0.684758	0.76362	0.350184	1.11380
MO	1.17694	0.98084	0.784315	1.15529	0.345312	1.50060
MT	.95413	0.78761	0.768879	0.92244	0.318435	1.24087
NE	1.03212	0.84207	0.839779	0.93205	0.297917	1.22997
NV	.91855	0.70141	0.753887	0.98573	0.149988	1.21842
NH	1.10815	0.90625	0.821332	1.07792	0.271299	1.34922
NJ	1.12465	0.95772	0.836790	1.15394	0.190084	1.34402
NM	.83135	0.66976	0.625788	1.08095	0.247554	1.32850
NY	1.17683	0.87226	0.784174	1.36119	0.139539	1.50073
NC	.94911	0.77556	0.780768	0.90409	0.311530	1.21562
ND	.98737	0.86316	0.788421	0.98525	0.267023	1.25228
OH	1.16866	0.99156	0.844094	1.25864	0.125875	1.38451
OK	.76669	0.62660	0.718032	0.85161	0.216157	1.06777
OR	.88533	0.79553	0.775571	1.00877	0.132757	1.14153
PA	1.14684	0.99885	0.822622	1.22740	0.166729	1.39413
RI	1.07659	1.00000	0.814024	1.22217	0.100375	1.32254
SC	.95908	0.78925	0.740653	1.03886	0.256038	1.29490
SD	.81900	0.61000	0.794333	0.68705	0.344104	1.03115
TN	.99511	0.85427	0.770193	1.02383	0.268191	1.29202
TX	.88546	0.74996	0.692644	1.05812	0.220245	1.27837
UT	.78162	0.69305	0.834916	0.82239	0.113768	0.93616
WA	.88977	0.80624	0.751731	1.07222	0.111403	1.18362
WV	.99419	0.80643	0.777489	0.97006	0.308622	1.27868
WI	1.11294	0.88916	0.877979	0.92513	0.342502	1.26763
WY	1.01064	0.81232	0.761345	0.93000	0.397351	1.32735
VT	.98514	0.84434	0.787736	0.90626	0.344311	1.25057
DMV	1.00771	0.97428	0.749689	1.16382	0.180347	1.34417

GRSPC65 = HIAA Gross Coverage/Population Under 65  
HIAAPC65 = Original HIAA Net Coverage/Population Under 65  
SIEPC65 = SIE Net Coverage/Population Under 65  
GRPDRT = HIAA Gross Group Coverage/SIE Net Coverage  
NGRPDRT = HIAA Gross Non-Group Coverage/SIE Net Coverage  
PRVTDRT = HIAA Gross Coverage/SIE Net Coverage  
DMV = District of Columbia, Maryland and Virginia

In addition to these general factors, specific aspects of the health insurance market may influence the duplication rate. Many carriers do not maintain up-to-date lists of eligible enrollees and, instead, check eligibility with the employer only when a claim is filed. When turnover rates are high, carrier-based enrollment files will include a significant number of "phantom enrollees" (U.S. Senate, 1951), although some duplicate coverage among the unemployed is attributable to continuation-of-benefits clauses in contracts (Lee, 1979; Price, 1976). In a few areas, carriers work with employers to avoid duplicate coverage. Such activities may be more effective when a single carrier, such as Blue Cross, has a dominant share of the market. Finally, duplicate coverage under conventional plans with coordination-of-benefits offers the enrollee the possibility of having co-payments covered. Because most HMO's have no co-payments and will not honor claims for non-emergency out-of-plan use, we expect that duplicate coverage involving HMOs is less attractive than duplicate conventional coverage.<sup>13</sup> This is supported by evidence from California that 14.5 percent of HMO enrollees have other health insurance coverage in contrast to 17 percent among those with other private insurance (Blumberg, 1980).

#### Estimation of the Model

Most of the theoretical variables can be straightforwardly identified in published data from the SIE and decennial census. This includes an industry distribution of the employed civilian labor force, the male unemployment rate, the number of earners per family, the percentage of working wives, and percent of workers who work full-time all year. Per capita income figures by state were prepared by the Bureau of Economic Analysis (1979). To reflect the regional variations in prices, these figures were adjusted following the method outlined by Fuchs, Michael and Scott (1979). Information on union membership is from the Bureau of Labor Statistics (1979).<sup>14</sup> In our regressions, observations for Washington, D.C., Maryland and Virginia are combined as one state. Therefore, each regression is based on a total of 49 observations.

Attempts to explain the overall duplicate coverage rate were only moderately successful. Ordinary least squares regression results produced corrected R<sup>2</sup> values of .38 to .40. Full-time employment was the only variable consistently significant in all formulations. More importantly, contrary to expectations, neither income nor earners per family were significant.

<sup>13</sup>An exception occurs when an HMO member is offered duplicate conventional coverage at no cost. Then the additional policy can be used as a backup for "second opinions."

<sup>14</sup>Unpublished data from the Bureau of Labor Statistics include union membership for Washington, D.C., with the Maryland data.

Suspecting that the reasons for purchasing group and individual health insurance may differ, separate group and non-group duplicate enrollment rates were approximated by using the residence-based group insurance enrollment as one numerator and non-group enrollment as the other. SIE estimates of private insurance coverage for those under 65 remained the denominator.<sup>15</sup> The sum of these two ratios yields the overall duplicate coverage rate.

#### Group Duplicate Coverage Rate

Estimates for alternative forms of the group duplicate coverage equation are provided in Table 2. The first equation, with seven variables, explains nearly 70 percent of the variation in group coverage across states. As expected, the proportion of full-time year-round workers, real per capita income, earners per family, and unionization are all positively related to group coverage. Reflecting "phantom coverage" and health benefits for laid-off workers, the male unemployment rate is positive and highly significant. The male unemployment rate was chosen as the better measure of turnover differentials; the overall unemployment rate is often dominated by teenagers and women newly entering the labor force—neither group is as likely to generate "phantom coverage." The HMO market share is negatively related to duplicate coverage.<sup>16</sup> The second equation indicates that a larger Blue Cross market share does not reduce the duplication rate. In fact, it is positive, but insignificant.

At first glance, one might expect the proportion of wives who are working to be a good measure of duplicate coverage, but as equation III indicates, it is inferior to the number of earners per family. This is probably because some married women with husband present are working because their husbands are disabled, unemployed, or otherwise not working and ineligible for health insurance. Thus, while the increasing proportion of working wives is probably one of the major reasons for duplicate coverage, the number of earners per family is a more sensitive measure.<sup>17</sup>

<sup>15</sup>One might prefer other dependent variables for different problems. For instance, net group coverage or net individual coverage per capita could be used for marketing analyses, while the ratio of group policies to group covered persons might be used for studies of benefit coordination. The published SIE data, however, do not break out source of coverage (group vs. non-group), so such studies must await further work.

<sup>16</sup>This variable is defined as total HMO enrollment divided by gross enrollment in all plans.

<sup>17</sup>In 1976, the husband was a non-earner in 7.2 percent of husband-wife families with the wife working (Johnson and Hayghe, 1977).

**TABLE 2**  
**Group Coverage, 1976**  
**(Dependent Variable is Gross Group Hospital Insurance Enrollment/Net Private Enrollment)**

	I	II	III	IV	V
Unemployment Rate	1.935** (.718)	1.775* (.749)	1.304 (.734)	2.194* (1.069)	1.656* (.820)
% Durable Manufacturing	.923** (.244)	.869** (.255)	.799** (.254)	1.039** (.339)	.872** (.252)
% Full-Time Employed	2.026** (.431)	1.999** (.435)	1.771** (.435)	2.162** (.510)	1.867** (.451)
Income per capita (real)	.047* (.021)	.049* (.021)	.055* (.022)	.050* (.023)	
Earners per family	.275* (.123)	.233 (.135)		.311* (.138)	.234 (.147)
% Union	.705** (.168)	.686** (.170)	.797** (.185)	.651** (.191)	.616** (.198)
% HMO	-.683* (.320)	-.669* (.322)	-.694* (.342)	-.653 (.333)	-.443 (.326)
% Blue Cross		.080 (.102)			
% Wife working			.317 (.324)		
% Mining				.570 (.915)	
% Agriculture				.055 (.414)	
Income per capita (nominal)					.027 (.020)
Constant	- 1.359	- 1.293	- .908	- 1.544	- 1.017
R <sup>2</sup> (Corrected)	.691	.689	.662	.679	.669

\*p < .05

\*\*p < .01

### Non-Group Coverage

Health insurance coverage is generally purchased on a non-group basis either when employer-group coverage is not available or to supplement group policies. In both instances, one would expect the primary determinants to be the complements of the variables explaining group coverage. As indicated in Table 3, two of the variables positively related to group coverage, per capita income and unionization, are negatively associated with non-group duplication.

Although not significant, the unemployment rate is also negative in the non-group equations. Among the industry variables, mining and agriculture are positively related to non-group coverage and public administration is negatively related. The strong association with mining is surprising since over 90% of employed miners have some form of private insurance, most of them with group coverage. Perhaps the recognized health risks of that industry induce more workers to purchase additional non-group policies. Or, more indirectly, mining might capture the attributes of a sparsely distributed population. The non-miners in small towns with few large employers may purchase

health insurance on a non-group basis. Finally, the historic commitment to community rating by Blue Cross plans leads to the expectation that non-group coverage might be more available in areas with large Blue Cross market shares. Instead, the Blue Cross variable is negative, albeit insignificant.

### Estimating Net Insurance Coverage by State

The preceding section examined reasons for duplicate health insurance coverage and how such coverage varies across states. For interpreting utilization levels, knowing the extent of duplicate coverage is important. For other purposes, one needs to know the extent of private health insurance coverage and why coverage rates vary across states. Unfortunately, SIE data pertain only to 1976, so estimates of coverage rates for earlier years must be derived from other sources. This leads to the twin purposes of this section: (1) to understand the factors that determine variations in the level of net insurance coverage across states and (2) to develop a simple means to estimate net coverage levels in years other than 1976.

**TABLE 3**  
**Non-Group Coverage, 1976**  
**(Dependent Variable is Gross Non-Group Hospital Insurance Enrollment/Net Private Enrollment)**

	I	II	III	IV
Unemployment rate	-.467 (.695)	-.511 (.685)		
Income per capita (real)		-.023 (.015)	-.024 (.015)	-.022 (.015)
% Mining	1.502** (.504)	1.387** (.503)	1.385** (.493)	1.533** (.462)
% Agriculture	.449 (.243)	.438 (.240)	.542** (.189)	.547** (.188)
% Public Administration	-1.198** (.453)	-.924 (.483)	-.956 (.474)	-.993* (.471)
% Union	-.264* (.117)	-.237* (.117)	-.234* (.116)	-.266* (.109)
% Blue Cross			-.063 (.073)	
Constant	.333	.460	.453	.428
R <sup>2</sup> (Corrected)	.483	.497	.499	.502

\*p < .05

\*\*p < .01

#### Variations in the Extent of Coverage

Whereas the previous section was concerned with the types of group and non-group coverage held by people with private health insurance, this section focuses on the factors differentiating states with high rates of private coverage from those with relatively less private coverage. As indicated in Table 1, net private coverage ranges from 60 to 87 percent. Net coverage will reflect factors which influence having either group or non-group policies, but not necessarily multiple policies. Our exploratory approach first tested variables appearing in either equation and then added other industry variables. The ratio of military personnel to civilians in the state was included as a proxy for military dependents who are eligible for government coverage through the CHAMPUS program. The importance of military dependents in explaining low private coverage rates was first identified in 1962-1963 (U.S. NCHS, 1967).

Table 4 presents the regression results for net coverage in 1976. As in the group duplication equations, real income and earners per family have positive coefficients. The negative sign for income in the non-group equations may therefore indicate that low income is associated with the absence of group coverage or, if one has enough money, non-group coverage may be purchased, but many low income people have no private coverage. (See U.S. NCHS, 1980, for other evidence supporting this finding.) The positive coefficient for earners suggests that in many cases dependents are not covered even though the family head may be covered. In fact, more than half of the population without coverage who are not in the labor force are in families headed by someone with

coverage (Congressional Budget Office, 1979). The three industry variables in the equation have the expected signs based upon the percentage of coverage in each industry nationally. The percentage of military personnel in the state is highly significant and has a value indicating about 2.3 civilian dependents for each person in the service. (Note that active duty personnel are excluded from the populations used in this analysis.)

The per capita income variable is tested twice, once in real and once in nominal terms. In most situations, real income determines purchasing decisions. Yet, the nominal measure is more significant statistically. There are several potential explanations for this surprising result. There may be a problem using the Laspeyres index devised by Fuchs, Michael and Scott (1979) as an adjustment factor to estimate real income.<sup>18</sup> Another possibility is that certain factors associated with areas having high price levels may lead to more coverage. (Following this line of reasoning, an urbanization variable was added to the equation.) It may also be the case that nominal, rather than real income is, in fact, the determinant of coverage, perhaps because of the implicit subsidy in the tax laws. Despite the somewhat better fit given by nominal income, we chose to use the real income measure until a better explanation can be found for the divergent results. Perhaps more importantly, this little digression points out the care one must exercise in choosing empirical versions of theoretical constructs.

<sup>18</sup>This Index was compared with the Bureau of Labor Statistics cost of living figures for 39 metropolitan areas, and, in general, the indices were similar.

**TABLE 4**  
**Net Health Insurance Coverage, 1976**  
**(Dependent Variable is Persons under 65 with Private Coverage/Civilian Population under 65)**

	I	II	III	IV	V	VI	VII
Income per capita (real)	.021* (.008)		.015 (.009)	.021* (.009)	.015 (.009)	.018 (.010)	.013 (.009)
Earners per family	.240** (.049)	.221** (.046)	.241** (.047)	.240** (.055)	.237** (.048)	.237** (.049)	.243** (.047)
% Military	- 2.300** (.464)	- 2.531** (.441)	- 2.272** (.454)	- 2.296** (.546)	- 2.350** (.485)	- 2.142** (.544)	- 2.326** (.453)
% Construction	- 2.037** (.324)	- 1.917** (.295)	- 1.715** (.367)	- 2.039** (.354)	- 1.667** (.382)	- 1.836** (.432)	- 1.633** (.370)
% Business and Repair Service	- 2.146** (.662)	- 2.350** (.614)	- 3.117** (.853)	- 2.144** (.686)	- 2.858** (1.011)	- 2.660** (1.041)	- 3.006** (.852)
Income per capita (nominal)		.211** (.057)					
% Urban			.097 (.055)		.085 (.060)	.081 (.061)	.084 (.056)
Unemployment Rate				-.004 (.354)			
% Blue Cross					.121 (.042)	.022 (.042)	
% HMO						-.125 (.147)	
% Union							.070 (.056)
Constant	.462	.501	.445	.463	.438	.433	.434
R <sup>2</sup> (Corrected)	.720	.757	.732	.713	.727	.726	.736

\*p < .05

\*\*p < .01

Several other variables are not significant in the net coverage analysis. The unemployment rate has essentially no impact, supporting the previous interpretation that its importance in the group duplication equation was through duplicate phantom coverage, rather than real coverage. The market shares of Blue Cross and HMO's are positive and negative, respectively, but neither approaches statistical significance. Unionization has a positive coefficient with a t-ratio of about 1.25. Contrasted with its powerful role in the group duplication equation, this suggests that unions may be more effective in obtaining comprehensive benefits for their members than in improving community coverage.

#### A Synthetic Time Series of Net Coverage by State

The first step in the estimating process involved using the coefficients from the net coverage equation for 1976 with the observed state values of the independent variables for 1950, 1960, and 1970. These data were derived from the decennial census and the Bureau of Economic Analysis (personal income data). The per capita income figures were adjusted to real values using the cross-sectional approach of Fuchs, Michael and Scott and the annual national consumer

price index. The net state coverage estimates for 1950, 1960, 1970 and the 1976 SIE figures were used to interpolate values for intervening years for each state. The state estimates were weighted by population under 65 to derive the coverage figures for each region and compared with the survey estimates in Table 5.

At least for the period 1959-76, the process worked rather well. It tracked the increase in coverage nationally from 69 percent to 78 percent of the population and captured the clear differences in coverage between the Northeast and North Central regions on one hand and the South and West on the other. Sampling error and slight changes in questions from survey to survey can account for several point differences. While the procedure correctly reflected the regional pattern of coverage in 1953, it substantially overestimated the overall levels, probably because the early 1950's were a period of major expansion in health insurance coverage and represented a different market situation.

To provide the most accurate possible estimates of coverage, regional adjustment figures were calculated for each survey year. Thus, for 1974, the adjustment for the West was +0.7. This adjustment was subtracted from the first stage estimate for each state in

**TABLE 5**  
**Actual and First Stage Synthetic Estimates of Net Coverage**  
**for the Population Under Age 65 by Region, 1953-1974**

Year	Northeast	North Central	South	West	U. S. Total
1953-Survey <sup>1</sup>	64.9	67.0	51.8	48.9	59.4
Estimate	74.6	72.9	66.1	63.8	70.0
1959-Survey <sup>2</sup>	78.0	76.0	57.6	63.8	69.2
Estimate	76.6	75.9	67.8	68.6	72.4
1962-63-Survey <sup>3</sup>	79.9	78.3	61.5	68.0	71.9
Estimate	78.6	78.1	70.1	70.4	74.4
1968-Survey <sup>4</sup>	83.9	84.2	70.3	74.7	78.2
Estimate	81.5	81.1	73.3	73.5	77.5
1970-Survey <sup>5</sup>	81.7	84.0	71.6	73.6	77.8
Estimate	82.7	82.3	74.7	74.8	78.7
1972-Survey <sup>6</sup>	81.1	82.1	71.3	71.9	76.7
Estimate	82.2	82.7	74.4	74.2	78.5
1974-Survey <sup>6</sup>	81.8	83.6	72.5	73.0	77.8
Estimate	81.8	83.1	74.0	73.7	78.2

#### SOURCES

<sup>1</sup>Anderson, Odin W. and Jacob J. Feldman. Family Medical Costs and Voluntary Health Insurance: A Nationwide Survey. New York: McGraw-Hill Book Company, 1956.

<sup>2</sup>Kovar, Mary Grace. Health Statistics from the U.S. National Health Survey, Series B, No. 26. "Interim Report on Health Insurance, United States, July-December 1959." Washington, D.C.: USGPO, December 1960.

<sup>3</sup>U.S. National Center for Health Statistics. Vital and Health Statistics, Series 10, No. 11. "Health Insurance Coverage, United States, July 1962-June 1963." August 1964.

<sup>4</sup>U.S. National Center for Health Statistics. Vital and Health Statistics, Series 10, No. 66. "Hospital and Surgical Insurance Coverage, United States, 1968." Publication (PHS) 72-1033, 1972.

<sup>5</sup>U.S. National Center for Health Statistics. Monthly Vital Statistics Report. Vol. 21, No. 9. "Hospital and Surgical Insurance Coverage Among Persons Under 65 Years of Age in the United States, 1970." Publication (HSM) 73-1128, 1972.

<sup>6</sup>U.S. National Center for Health Statistics. Vital and Health Statistics, Series 10, No. 117. "Hospital and Surgical Insurance Coverage United States - 1974." Publication (HRA) 77-1545, 1977.

NOTE: The 1953 survey of health insurance coverage does not provide estimates for the under 65 age population by region. Data are provided by region for coverage of all persons and national estimates are given for the over 64 and total populations. The ratio of the latter two numbers was applied to the regional figures to estimate the coverage rate for the over 64 population. Using the proportion of the population over 64 in each region with this estimated coverage rate and the known overall coverage rate, we estimated coverage for the under 65 age group.

that region. The weighted average of these revised state estimates now exactly equals the observed survey figure for that year. As a last step, the net coverage figures for other years were calculated by interpolating between the revised state estimates for survey years. Thus, for each of the benchmark years, the weighted average of the net coverage figures for all the states in a region will exactly equal the observed regional coverage figure. Variations in coverage across states *within* a region reflect the underlying estimation process. These data for 1953-76 are presented in the appendix.

### Implications for Research

The presence of duplicate coverage creates problems for research and analysis of health services utilization, which, if unheeded, can lead to substantial errors. For instance, suppose one knows that 25 percent of the people with coverage X have duplicate coverage with carrier Y. To which carrier should their hospital use be attributed? How should a utilization rate be computed? How meaningful are such rates if people choose the plan they bill? Although most of the research problems occur when one is using aggregate data, the duplicate coverage issue also has implications for the analysis of behavior at an individual level. While the analytic problems are important when people have two conventional plans, they are much more crucial to the analysis of HMO enrollees who also have conventional coverage. In such cases, out-of-plan use may be a meaningless concept. Moreover, the standard notion of primary insured<sup>19</sup> may be irrelevant because if HMOs and conventional carriers do not coordinate benefits, the insured have no reason to report duplicate coverage.

#### Potential Problems Arising from the Use of HIAA Net Enrollment Figures

Because they have been the only source of health insurance coverage at a state level, the HIAA net enrollment figures often have been used in cross-sectional studies (Feldstein, 1971; Feldstein and Taylor, 1977; Fuchs and Kramer, 1972; Goldberg and Greenberg, 1977; Rosenthal, 1964). Given the rather low correlation between the HIAA and SIE figures, previous interpretations of the insurance coefficient might well be wrong. That is, the HIAA percent coverage figures serve as very poor proxies for true coverage rates by state.

The inaccuracy in the HIAA figures has implications beyond confounding the insurance coefficient. If the HIAA coverage estimate was a poorly estimated, but unbiased, approximation of the true value, then only its regression coefficient would be biased

<sup>19</sup>Primary insured is the person whose employment is the source of coverage.

toward zero. However, the error in HIAA figure due to duplicate coverage portion is strongly correlated with other variables that are important in utilization studies, such as income and unionization. This creates a classic "errors-in-variables problems" and suggests that the coefficients for other variables in the equation may also be biased. Unfortunately, the direction of the bias cannot be determined without knowing the partial correlations among the variables (Kmenta, 1971).

#### The Bias in Comparisons of Utilization by Insured Persons

The difficulty with the HIAA data can be overcome by using the SIE figures for 1976 or, for other years, our synthetic estimates using the SIE coverage patterns and other surveys as benchmarks. Such simple solutions are not applicable to certain other research areas. For instance, two potentially valuable sources of data are all Blue Cross enrollees and Federal employees choosing the Blue Cross option. Goldberg and Greenberg (1977, 1980) based their analyses of the HMO competitive effect on these data. Luft (1979) proposed a similar study including variations over time as well as across states. However, because of duplicate coverage, it is impossible to identify the appropriate Blue Cross denominators and utilization rates are therefore undefined.

There is a simple test of whether this is a real problem or just a potential but unimportant bias. The rate of hospital admissions varies markedly across the country, reflecting both supply and demand factors. We would expect such factors to have comparable impact on both the population in general and people with Blue Cross coverage. Although the two rates will not be identical, there is no reason to expect the duplicate coverage rate to have a negative effect on the true utilization rate of BC members. (One might even expect a positive relation, if duplicate coverage leads to hospitalization for profit.) We specify the equation in log form and, since the AHA admission rate includes people of all ages, include the percent of the state's population over 65 as well as the group duplication rate.

$$BC-ADS_{group} = .191 + .926 AHA-ADS - .366 Duplicate_{group} + .472 \% > 65$$

(standard error in parentheses)

The significant negative coefficient for the duplicate coverage rate suggests that carrier-based utilization data are, in fact, biased by duplicate coverage and that a 1 percent increase in duplicate coverage in a state reduces the reported Blue Cross admission by about 0.37 percent.<sup>20</sup>

<sup>20</sup>Clearly, there are problems of endogeneity in this equation that preclude causal interpretation. It is merely presented as a demonstration that carrier-based utilization rates may be biased by duplicate coverage.

If it is reasonable to generalize this result, duplicate coverage may invalidate studies using cross-sectional comparisons of carrier-based data. The same threat to validity occurs in the analysis of plan-specific data over time. The increasing importance of duplicate coverage suggests that if the true admission rate for plan enrollees is constant, the measured rate will show a decline (Luft, 1981). An example may be instructive. The Hawaii Medical Service Association, a Blue Shield plan, reports markedly declining utilization rates in the last 5 years. Yet, the hospital utilization data reported by the American Hospital Association show an increase. The high rate of duplicate coverage and potential for enrollment in both HMSA and Kaiser may explain the discrepancy in these two trends.<sup>21</sup>

With substantial but unknown levels of duplicate coverage among the enrollees of specific plans, it becomes difficult to evaluate innovations which are designed to reduce hospital admissions such as improved ambulatory benefits, outpatient surgery and second opinions. Without accurate estimates of the denominator, changes in admission rates cannot be used to measure performance.

#### Premium and Benefit Estimates

Although the primary focus of this section is on the implications of duplicate coverage for estimates of utilization, there are also problems with premiums and benefit estimates. Fortunately, the published state HIAA financial data are not adjusted in the same manner as their coverage statistics, so they are comparable to the raw gross enrollment statistics. Whereas duplication results in double counting people in enrollment statistics, having two health insurance policies does not double one's benefits. Carriers attempt to coordinate benefits so that the total reimbursement does not exceed the expenses in-

<sup>21</sup>Hawaii has an exceptionally high proportion of multi-earner families. HMSA strongly discourages duplicate coverage under its own plan by paying only the benefits offered by the more comprehensive contract. This provides an incentive for two worker families to choose a combination of Kaiser or a commercial carrier plus HMSA, rather than letting the fringe benefit be lost.

curred. Furthermore, since most group policies are experience-rated, this coordination is eventually reflected in relatively lower premiums.<sup>22</sup>

In some studies, a measure of benefits per insured person is used (see for example, Fuchs and Kramer, 1972). Even if the total benefit measure is not far from the mark, a biased enrollment figure in the denominator will threaten the validity of such figures. More importantly, one should probably distinguish populations that have moderate benefit levels resulting from uniform single policy coverage from those with the same average benefits resulting from a small fraction with multiple policies. The same problems occur in the analysis of premium per enrollee.

#### Implications for Micro Studies

Although this discussion has focused on analyses that utilize aggregate data for states or insurance plans, duplicate coverage also presents problems for researchers working with data at an individual level. Individuals are often used as the unit of observation in studies of hospital or ambulatory care use by HMO members, and well designed studies often attempt to measure out-of-plan use (Pope, Freeborn, and Greenlick, 1972; Scitovsky, Benham, and McCall, 1981).

But how is out-of-plan use defined when a person is covered by both an HMO and a conventional insurer such as Blue Cross? The HMO may be the primary source of care and the BC/BS coverage used for

<sup>22</sup>The following regression offers some insight into the role of group and non-group policies in the benefit-to-premium ratio:

$$\begin{aligned} \text{BENFT/PREM} = & .815 + .014 \text{ GRDPRT} - .174 \text{ INDVDR} \\ & (.052) \quad (.043) \quad (.069) \\ + & .110 \text{ PCTBCGRP} - .011 \text{ PCTBCNGP} \\ & (.046) \quad (.039) \end{aligned}$$

$R^2 = .372$   
standard error in parentheses

Non-group policies are significantly related to lower payout ratios and the Blue Cross market share of group policies, PCTBCGP, is reflected in higher payout rates. The group duplication rate, GRDPRT, is positive and not significant. This suggests that the effects of increasing duplication on benefits per enrollee are reflected in premiums per enrollee. A potential factor which may explain the positive coefficient is the possibility that duplication is more common for enrollees of large firms and such firms have lower administrative load factors per employee.

second opinions or an occasional "convenience visit." Alternatively, a person may have a long standing pattern of using the HMO for certain types of visits such as preventive checkups or pediatric care and fee-for-service providers for others. Finally, the HMO may be used just as a backup provider.<sup>23</sup> Here the usual definition of out-of-plan use may be meaningless. The issue is further complicated because people can use their multiple coverages in ways that have nothing to do with whose employer provides the coverage. That is, subscriber vs. dependent status may be irrelevant.

While the effective cost of insurance, the ratio of premiums to benefits, may influence the purchase of non-group coverage, it probably has little impact on employer decisions for coverage. Employers shop for carriers with low premium/benefit ratios for specific types of coverage, but the popularity of first dollar coverage, prescription drug coverage, and other features with high administrative costs suggests that factors other than just premium loading may influence the choice of plan. Furthermore, since few employees have the option of converting unwanted duplicate coverage into other fringe benefits, the extent of duplicate coverage is largely involuntary. A small number of people may choose their employers based on health insurance packages, but to the extent this occurs, it probably reflects people who face the choice of group vs. nongroup coverage. Thus, future studies of health insurance coverage should focus on the role of occupation in determining the extent of coverage of each family member, through whom such coverage is obtained, and why. (See, for example, Phelps, 1976, and the National Medical Care Expenditure Survey, 1980.)

### **Implications for Policy**

Many of the data problems raised in the preceding section will have an indirect impact on policy by altering the conclusions of studies that shape our perception of the medical care system. However, duplicate coverage also has direct implications for several policy areas: (1) alternative tax treatment of group health insurance and the ability of employees to reallocate fringe benefits; (2) the geographic disparities in duplicate coverage and the transfers implicit in different forms of national health insurance financing; and (3) the impact of duplicate coverage on health insurance premiums.

<sup>23</sup>For example, the University of California offers its employees in Northern California fully paid Kaiser coverage for families while BC/BS coverage costs an additional \$550 per year. A reasonably healthy family planning to use fee-for-service practitioners for routine ambulatory care would be better off choosing Kaiser rather than BC/BS, even if Kaiser is used only for major expenses. If a second family member has access to less expensive BC/BS coverage, then the obvious choice is Kaiser plus BC/BS duplicate coverage.

Both the rise in labor force participation of married women and expansion in fringe benefits provided by employers suggest that duplicate coverage will be growing. When employees do not have the option of allocating their employer contribution for other things, such as retirement benefits, dental insurance, or even taxable income, the result is often unwanted and unnecessary duplicate health insurance coverage. With experience-rated premiums, the lower claims-paid cost that occurs when people have duplicate coverage will reduce the average cost. This results in an indirect income transfer from multi to single earner families. In an era when the take-home pay of many working wives barely covers child care expenses, it seems absurd to effectively forego employer health insurance contributions that may be equivalent to over \$1000 per year in tax-free income. A strong case is being made by some to place ceilings on tax exempt employer contributions to encourage the choice of less expensive health plans. (See proposals such as those introduced by Senators Durenberger, Health Incentive Reform Act of 1979 (S. 1968), and Schweiker, Comprehensive Health Care Reform Act (S. 1590), or Representatives Ullman, Health Cost Restraint Act of 1979 (H.R. 5740), and Gephardt and Stockman, National Health Care Reform Act (H.R. 7527). These proposals are generally based upon the Consumer Choice Health Plan (Enthoven, 1978)). An important component of such policy changes should be encouragement for employees to decline health insurance coverage from one employer if already covered through another family member. However, the worker should be able to direct the employer's contribution for health insurance to some other benefit. To make such a system attractive, the employee who chooses to be covered by his or her spouse must be allowed to reenter the plan without proof of insurability if the spouse loses his or her coverage.

Although the duplicate coverage issue is an important factor in the current system, it becomes even more crucial in the context of National Health Insurance proposals that rely on mandated employer-based financing. One of the problems faced by employer-based coverage is the possibility that it will require such a substantial expansion of fringe benefits for part-time and low-paid workers that firms will eliminate those positions. If such positions are filled primarily by second or third workers in a family, the ability to decline health insurance coverage, especially if the person has coverage through other family members, may have a substantial beneficial effect on employment options. Hawaii's compulsory health insurance law exempts employees who work less than 20 hours per week. If someone works for more than one employer, the one who pays the most wages is considered the primary employer and is responsible for providing coverage (Skolnik, 1975). A possible better

alternative might allow workers to pool the fringe benefits of the family's multiple employers to buy a single, more comprehensive health insurance package. A ceiling on the tax deductibility of employer contributions may also make complementary coverage through multiple employers more attractive. While it may be administratively impossible to design such complementary policies, large insurers, such as Blue Cross, might offer to provide complementarity if both spouses have Blue Cross coverage, e.g., two low option Blue Cross family plans may be traded for one high option family coverage plan.

#### **Transfers Resulting from Duplicate Coverage**

Health insurance is designed to spread the risk of medical care expenses among a large group of people, all of whom are expected to benefit similarly from such sharing. Once a person has reasonably complete coverage through one policy, additional policies offer little additional benefit because insurers and employers do not usually offer "complementary packages," such as a "well baby visit" or "prescription drug" package to fill in the gaps left by the primary policy. Thus, people with duplicate group coverage will use less than their actuarial share of services and are effectively subsidizing the others in their group who do not have duplicate policies. In an analogous fashion, those employee groups with a high proportion of duplicate coverage (say, because a high proportion of the employees' spouses are working and have coverage) can have a broader benefit package for the same fringe benefit contribution.

National Health Insurance proposals that rely on employer contributions for financing will reinforce this tendency. If risks and costs are pooled nationally, then areas with extensive duplicate coverage, such as the industrial Northeast and Midwest will subsidize the rest of the country. On the other hand, if benefits and premiums are allowed to vary by area, then these industrialized areas will be able to afford extra benefits at lower per capita cost. Industrywide increases in fringe benefits in those industries whose products have relatively inelastic demand curves will shift the costs of such benefits forward to consumers. The changes in benefit patterns will be influenced by the duplicate coverage levels existing in the industry and the ground rules set for benefit packages, premium determination, and fringe benefit flexibility.

#### **Insurance Rates**

Many states regulate the premiums charged by health insurance carriers for non-group policies. For group policies, premiums often are based on prior cost or benefit experience. In each case, the costs that influence future premium levels include benefits paid to subscribers or providers and administrative expense. The vigor of carrier attempts to control both types of costs may reflect, in part, the degree to which their costs exceed or fall short of projections. (This perspective reflects a satisficing model of behavior rather than an optimizing model. (See Simon, 1959). While a satisficing model may be applicable to the entire industry, its relevance is heightened by the dominant role played by the not-for-profit Blue Cross and Blue Shield plans.)

As duplicate coverage increases, premiums based on historic utilization patterns will exceed realized costs because an increasing fraction of the plan's enrollees will charge their costs to another carrier (Luft, 1981). This will generate a tendency towards slack, rather than tightness in the budgetary process, and may reduce the incentives for the organization to initiate aggressive cost containment efforts. As previously mentioned, many cost containment strategies, such as outpatient surgery, second surgical opinions, and ambulatory benefits, may be evaluated incorrectly because duplicate coverage trends bias the plan's data.

Although duplicate health insurance coverage has long been recognized by the industry, it has attracted little attention from either researchers or policy makers. Yet, it is far more important than might be discerned from technical discussions of the differences between national estimates of the population with coverage based on survey vs. enrollment data. Duplication through group and non-group policies is substantial, growing, and varies markedly across states, industries, and family situations. Relatively simple regression models can explain a substantial fraction of this variation across states and subsequent research will surely be able to improve our understanding of the reasons for duplicate coverage. The available data already allow us to question earlier studies of the medical care system that relied upon invalid estimates of health insurance coverage and should warn future researchers to be more cautious of their data. Recognizing the importance of duplicate coverage also allows us to reassess proposals concerning employer contributions for health insurance and to suggest modifications. Simply adding the duplicate coverage issue to the agenda should improve the policy making process.

## Acknowledgments

We are indebted to Peter C. Karzmark for his assistance in collecting and preparing these data. Ross Arnett, Mark Blumberg, Louis Garrison, Willard Manning, Thomas Musco, Peter Thexton, Kenneth White, and faculty and staff of the Institute for Health Policy Studies, School of Medicine, University of California, San Francisco, provided helpful comments on an earlier draft.

## References

- Andersen, Ronald and Odin W. Anderson, *A Decade of Health Services: Social Survey Trends in Use and Expenditure*, Chicago: The University of Chicago Press, 1967.
- Andersen, Ronald and Donald C. Riedel, "People and Their Hospital Insurance—Comparisons of the uninsured, those with one policy, and those with multiple coverage," *Research Series 23*. Center for Health Administration Studies, University of Chicago, Chicago, 1967.
- Andersen, Ronald, Joanna Llon and Odin W. Anderson, *Two Decades of Health Services: Social Survey Trends in Use and Expenditure*, Cambridge, MA: Ballinger, 1976.
- Anderson, Odin W. and Jacob J. Feldman, *Family Medical Costs and Voluntary Health Insurance: A Nationwide Survey*, New York: McGraw-Hill, Inc., 1956.
- Anderson, Odin W., Patricia Collette and Jacob J. Feldman, *Changes in Family Medical Care Expenditures and Voluntary Health Insurance: A Five-Year Resurvey*, Cambridge, MA: Harvard University Press, 1963.
- Bonham, Gordon and Larry Corder, "National Medical Care Expenditure Survey: Household Interview Instruments: Instruments and Procedures 1," U.S. National Center for Health Services Research, DHHS Pub. No. (PHS) 81-3280, 1981.
- Blumberg, Mark S., *Health Status and Health Care Use by Type of Private Health Insurance Coverage*, Kaiser Foundation Health Plan, Oakland, CA, May 2, 1980.
- Carroll, Marjorie Smith, "Private Health Insurance Plans in 1976: An Evaluation," *Social Security Bulletin* 41(9):3-16, September 1978.
- Enthoven, Alain C., "Consumer Choice Health Plan," *New England Journal of Medicine* 298:650-658, 709-720, 1978.
- Feldstein, Martin, "Hospital Cost Inflation: A Study of Nonprofit Price Dynamics," *American Economic Review* 61(5):853-872, December 1971.
- Feldstein, Martin and Amy Taylor, "The Rapid Rise of Hospital Costs," Discussion Paper No. 531, Harvard Institute of Economic Research, Cambridge, MA, January 1977.
- Ferber, Bernard, "The Relationship of Multiple Health Insurance Coverage and Hospital Utilization," *Inquiry* 3:14-27, December 1966.
- Fuchs, Victor R. and Marcia J. Kramer, "Determinants of Expenditures for Physician Services in the United States, 1948-1968," Occasional Paper 117. National Bureau of Economic Research, New York, 1972.
- Fuchs, Victor R., Robert T. Michael, and Sharon R. Scott, "A State Price Index," Working Paper No. 320. National Bureau of Economic Research, Cambridge, MA, February 1979.
- Greene, Joshua E., "Tax Subsidies for Medical Care: Current Policies and Possible Alternatives," Background Paper. U.S. Congressional Budget Office. Washington, D.C., January 1980.
- Goldberg, Lawrence G., and Warren Greenberg, *The Health Maintenance Organization and Its Effects on Competition*, Bureau of Economics, Federal Trade Commission. Washington, D.C., July 1977.
- Goldberg, Lawrence G., and Warren Greenberg, "The Competitive Response of Blue Cross to the Health Maintenance Organization," *Economic Inquiry* 18(1):55-68, January 1980.
- Health Insurance Institute, "Worksheet for Estimates of Health Insurance Enrollment, 1976," New York. Personal communication.
- The Robert Wood Johnson Foundation, "Special Report: A New Survey on Access to Medical Care," Princeton, NJ, 1978.
- Johnson, Beverly L., and Howard Hayghe, "Labor Force Participation of Married Women, March 1976," *Monthly Labor Review* 100:32-36, June 1977.
- Kmenta, Jan, *Elements of Econometrics*, New York: Macmillan Publishing Co., Inc., 1971.
- Kovar, Mary Grace, "Interim Report on Health Insurance, United States, July-December 1959," Health Statistics from the U.S. National Health Survey. Series B, No. 26. Washington, D.C., December 1960.
- Lee, A. James, *Employment, Unemployment, and Health Insurance*, Cambridge, MA: Abt Books, 1979.
- Luck, Elizabeth, "The Problem of Duplicate Coverage and Overinsurance," *Inquiry* 1:21-34, August 1963.
- Luft, Harold S., "Competition and Regulation: The Selection and Competitive Effects of HMOs," Health Care Financing Administration Grant 18-P-97127-01, 1979.
- Luft, Harold S., "Diverging Trends in Hospital Utilization: Fact or Artifact?" *Medical Care*, 19(10):979-994; October 1981.
- Mitchell, Bridger M., and Ronald J. Vogel, "Health and Taxes: An Assessment of the Medical Deduction," *Southern Economic Journal* 41:660-672, April 1975.
- Phelps, Charles E., "The Demand for Reimbursement Insurance," In Richard Rosett, Ed., *The Role of Health Insurance in the Health Services Sector*. New York: National Bureau of Economic Research, 1976.
- Pope, Clyde K., D. K. Freeborn, and Merwyn R. Greenlick, "Use of Outside Physicians by Members of a Group Practice Prepayment Plan," Presented at the Annual Meeting of the American Public Health Association, November 12-16, 1972.

- Price, Daniel N., "Health Benefits of Laid-off Workers," *Social Security Bulletin* 39(2):40-45; 51, February 1976.
- Reed, Louis S., "Private Health Insurance: Coverage and Financial Experience, 1940-1966," *Social Security Bulletin* 30(11):3-22, 1967.
- Reed, Louis S., "The Extent of Health Insurance Coverage in the United States," Research Report No. 10. U.S. DHEW, SSA, Office of Research and Statistics, 1965.
- Rosenthal, Gerald D., *The Demand for General Hospital Facilities*, Chicago: American Hospital Association, 1964.
- Scitovsky, Anne A., Lee Benham, and Nelda McCall, "Out-of-Plan Use Under Two Prepaid Plans," *Medical Care*, 19(12):1165-1193; December 1981.
- Skolnik, Alfred M., "Compulsory Health Insurance in Hawaii," *Social Security Bulletin* 38(12):23-24, December 1975.
- Simon, Herbert A., "Theories of Decision-Making in Economics and Behavioral Science," *American Economic Review* 49(3):253-283, June 1959.
- Steuerle, Eugene, and Ronald Hoffman, "Tax Expenditures for Health Care," Paper No. 38. Office of Tax Analysis, Department of the Treasury. April 1979.
- Thexton, Peter M., Actuary, Health Insurance Association of America, New York, N.Y. Letter August 1981.
- U.S. Bureau of the Census, Current Population Reports, Series P-20, No. 334, "Demographic, Social and Economic Profile of States: Spring 1976." U.S. GPO, Washington, D.C., 1979.
- U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 110. "Money Income and Poverty Status in 1975 of Families and Persons in the United States and the Northeast Region, by Divisions and States." U.S. GPO, Washington, D.C., 1978.
- U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 111. "Money Income and Poverty Status in 1975 of Families and Persons in the United States and the North Central Region, by Divisions and States." U.S. GPO, Washington, D.C., 1978.
- U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 112. "Money Income and Poverty Status in 1975 of Families and Persons in the United States and the South Region, by Divisions and States." U.S. GPO, Washington, D.C., 1978.
- U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 113. "Money Income and Poverty Status in 1975 of Families and Persons in the United States and the South West Region, by Divisions and States." U.S. GPO, Washington, D.C., 1978.
- U.S. Bureau of the Census, Selected Characteristics of Persons by State and Health Service Area: 1976 Survey of Income and Education. Unpublished data. November 29, 1978.
- U.S. Bureau of the Census, Survey of Income and Education Interviewer's Manual. U.S. GPO, Washington, D.C., 1976.
- U.S. Bureau of Economic Analysis, Per Capita Personal Income, by States and Regions, Selected Years. Computer Print-out, April 1979.
- U.S. Bureau of Labor Statistics, Union Membership, By Sta. 1976. Unpublished data.
- U.S. Division of Health Maintenance Organizations, Summary of the National HMO Census of Prepaid Plans. June 1976.
- U.S. Congressional Budget Office, "Profile of Health Care Coverage: The Haves and Have-Nots" Background Paper. Washington, D.C., 1979.
- U.S. House of Representatives, Health Cost Restraint Tax Act of 1979 (H.R. 5740), 96th Congress, 1st session. October 30, 1979.
- U.S. House of Representatives, National Health Care Reform Act (H.R. 7527), 96th Congress, 1st session. June 1980.
- U.S. National Center for Health Services Research, National Health Care Expenditure Study. "Who Are the Uninsured?" Data Preview 1. DHEW, PHS, Office of Health Research, Statistics and Technology, 1980.
- U.S. National Center for Health Statistics, Health Insurance Coverage, United States, July 1962 - June 1963. Vital and Health Statistics. Series 10, No. 11. Washington, D.C., August 1964.
- U.S. National Center for Health Statistics, "Hospital and Insurance Coverage, United States, 1968," Vital and Health Statistics. Series 10, No. 66, DHEW, PHS (HSM)72-1033, Washington, D.C., 1972.
- U.S. National Center for Health Statistics, "Hospital and Surgical Insurance Coverage Among Persons Under 65 Years of Age in the United States, 1970," Monthly Vital Statistics Report. Vol. 21, No. 9, Supplement 2. DHEW, PHS, (HSM)73-1128, Washington, D.C., December 18, 1972.
- U.S. National Center for Health Statistics, "Hospital and Surgical Insurance Coverage Among Persons Under 65 Years of Age in the United States, 1974," Monthly Vital Statistics Report. Vol. 25, No. 2, Supplement 3. DHEW, PHS, (HRA)76-1120, Washington, D.C., May 19, 1976.
- U.S. National Center for Health Statistics, "Hospital and Surgical Insurance Coverage, United States, 1974," Vital and Health Statistics. Series 10, No. 117, DHEW, PHS, (HRA)77-1545, Washington, D.C., August 1977.
- U.S. National Center for Health Statistics, "Health Care Coverage: United States, 1976," Advance Data. Vital and Health Statistics. No. 44, September 20, 1979.
- U.S. National Center for Health Statistics, "Basic Data on Health Care Needs of Adults Ages 25-74 Years: United States, 1971-75," Vital and Health Statistics. Series 11, No. 218, DHHS, PHS, (PHS)81-1668, Hyattsville, M.D., December 1980.
- U.S. Senate, Comprehensive Health Care Reform Act (S. 1590), 96th Congress, 1st session. July 26, 1979.
- U.S. Senate, Health Incentives Reform Act of 1979 (S. 1968), 96th Congress, 1st session. November 1, 1979.
- U.S. Senate, "Health Insurance Plans in the United States," Report of the Committee on Labor and Public Welfare. Report 359, Part I. 82nd Congress, 1st session. Washington, D.C., 1951.

**APPENDIX 1**  
**Revised Estimates of Net Health Insurance Coverage for the Population Under 65**  
**1953-1976**

State	1953	1954	1955	1956	1957	1958	1959
AL	0.556878	0.563856	0.570834	0.577812	0.584790	0.591768	0.598746
AK							
AR	0.515675	0.526595	0.537514	0.548433	0.559353	0.570272	0.581191
AZ	0.481440	0.503742	0.526043	0.548345	0.570646	0.592947	0.615249
CA	0.495011	0.519253	0.543495	0.567737	0.591979	0.616221	0.640463
CO	0.483501	0.509945	0.536389	0.562833	0.589277	0.615722	0.642166
CT	0.667552	0.689585	0.711619	0.733653	0.755687	0.777720	0.799754
DE	0.576174	0.584709	0.593244	0.601779	0.610314	0.618849	0.627384
FL	0.457142	0.466677	0.476211	0.485746	0.495280	0.504815	0.514349
GA	0.552045	0.560917	0.569789	0.578661	0.587532	0.596404	0.605276
HI							
ID	0.501661	0.525449	0.549238	0.573027	0.596816	0.620604	0.644393
IL	0.692510	0.707465	0.722421	0.737377	0.752333	0.767288	0.782244
IN	0.675100	0.690619	0.706138	0.721657	0.737177	0.752696	0.768215
IA	0.642405	0.659498	0.676591	0.693684	0.710776	0.727869	0.744962
KS	0.585658	0.603445	0.621232	0.639019	0.656806	0.674593	0.692380
KY	0.492168	0.501092	0.510016	0.518940	0.527864	0.536788	0.545712
LA	0.500368	0.509049	0.517730	0.526410	0.535091	0.543772	0.552453
ME	0.590979	0.613246	0.635512	0.657779	0.680046	0.702313	0.724579
MA	0.664982	0.688209	0.711536	0.734864	0.758191	0.781519	0.804846
MI	0.689011	0.703189	0.717368	0.731547	0.745725	0.759904	0.774093
MN	0.653573	0.669958	0.686343	0.702727	0.719112	0.735497	0.751881
MS	0.532774	0.540439	0.548103	0.555767	0.563432	0.571096	0.578760
MO	0.651750	0.664621	0.677489	0.690358	0.703226	0.716094	0.728962
MT	0.507268	0.531602	0.555935	0.580269	0.604602	0.628935	0.653269
NE	0.613933	0.629206	0.644479	0.659752	0.675024	0.690297	0.705570
NV	0.478103	0.501704	0.525304	0.548904	0.572505	0.596105	0.619706
NH	0.624109	0.648729	0.673350	0.697971	0.722592	0.747213	0.771834
NJ	0.639094	0.661077	0.683061	0.705045	0.727029	0.749013	0.770996
NM	0.366969	0.383965	0.400961	0.417956	0.434952	0.451948	0.468944
NY	0.651053	0.672258	0.693464	0.714669	0.735875	0.757080	0.778286
NC	0.554525	0.563791	0.573057	0.582323	0.591589	0.600855	0.610121
ND	0.614536	0.630184	0.645831	0.661478	0.677125	0.692772	0.708419
OH	0.681225	0.695478	0.709730	0.723983	0.738236	0.752489	0.766741
OK	0.469915	0.483011	0.496107	0.509204	0.522300	0.535396	0.548493
OR	0.524181	0.550555	0.576928	0.603302	0.629675	0.656049	0.682422
PA	0.646917	0.668891	0.690866	0.712841	0.734816	0.756790	0.778765
RI	0.645685	0.665686	0.685687	0.705687	0.725688	0.745689	0.765690
SC	0.569163	0.572530	0.575897	0.579265	0.582632	0.585999	0.589366
SD	0.592236	0.606607	0.620979	0.635350	0.649721	0.664093	0.678464
TN	0.521119	0.531972	0.542825	0.553678	0.564532	0.575385	0.586238
TX	0.485760	0.499089	0.512417	0.525746	0.539075	0.552404	0.565733
UT	0.533049	0.560567	0.588085	0.615603	0.643120	0.670638	0.698156
WA	0.466800	0.496021	0.525243	0.554464	0.583686	0.612907	0.642129
WV	0.533955	0.541465	0.548974	0.556484	0.563994	0.571504	0.579013
WI	0.688202	0.702914	0.717625	0.732337	0.747048	0.761760	0.776471
WY	0.466548	0.493815	0.521082	0.548350	0.575617	0.602884	0.630152
VT	0.604671	0.630781	0.656892	0.683002	0.709112	0.735222	0.761333
DMV	0.530105	0.541183	0.552261	0.563340	0.574418	0.585496	0.596574

APPENDIX 1 (Cont'd.)

State	1960	1961	1962	1963	1964	1965	1966
AL	0.604957	0.611168	0.617379	0.623591	0.637386	0.651181	0.664977
AK				0.296238	0.314214	0.332190	0.350166
AR	0.591921	0.602652	0.613382	0.624112	0.642618	0.661125	0.679632
AZ	0.627560	0.639871	0.652182	0.664493	0.678492	0.692491	0.706490
CA	0.652645	0.664828	0.677010	0.689193	0.702374	0.715555	0.728736
CO	0.653375	0.664583	0.675792	0.687001	0.698149	0.709298	0.720447
CT	0.805343	0.810932	0.816520	0.822109	0.831161	0.840213	0.849264
DE	0.638308	0.649232	0.660156	0.671080	0.690640	0.710201	0.729761
FL	0.533380	0.552411	0.571442	0.590473	0.620510	0.650546	0.680583
GA	0.613841	0.622406	0.630971	0.639536	0.655838	0.672141	0.688443
HI				0.531407	0.555719	0.580032	0.604344
ID	0.655153	0.665914	0.676674	0.687434	0.698870	0.710306	0.721742
IL	0.786054	0.789865	0.793675	0.797486	0.806586	0.815686	0.824787
IN	0.773296	0.778377	0.783458	0.788540	0.799146	0.809753	0.820360
IA	0.751447	0.757931	0.764416	0.770900	0.782854	0.794807	0.806761
KS	0.700027	0.707673	0.715320	0.722966	0.736238	0.749509	0.762780
KY	0.556885	0.568057	0.579230	0.590402	0.610164	0.629926	0.649687
LA	0.560941	0.569430	0.577918	0.586406	0.602670	0.618934	0.635199
ME	0.729624	0.734609	0.739713	0.744758	0.753007	0.761255	0.769504
MA	0.812361	0.819877	0.827392	0.834907	0.846097	0.857286	0.868476
MI	0.780626	0.787170	0.793713	0.800257	0.813261	0.826264	0.839268
MN	0.758253	0.764624	0.770995	0.777366	0.789405	0.801443	0.813482
MS	0.588042	0.597324	0.606605	0.615887	0.633547	0.651208	0.668868
MO	0.734574	0.740186	0.745798	0.751409	0.763607	0.775805	0.788003
MT	0.666126	0.678984	0.691841	0.704699	0.718750	0.732800	0.746851
NE	0.712554	0.719538	0.726523	0.733507	0.746734	0.759960	0.773187
NV	0.633390	0.647073	0.660757	0.674441	0.689838	0.705235	0.720632
NH	0.779344	0.786854	0.794365	0.801875	0.812627	0.823379	0.834130
NJ	0.775406	0.779815	0.784225	0.788635	0.796131	0.803627	0.811123
NM	0.484932	0.500919	0.516907	0.532895	0.553565	0.574235	0.594905
NY	0.782488	0.786691	0.790893	0.795096	0.802575	0.810055	0.817535
NC	0.617801	0.625482	0.633162	0.640842	0.655833	0.670825	0.685816
ND	0.711774	0.715129	0.718485	0.721840	0.730103	0.738366	0.746629
OH	0.773286	0.779831	0.786376	0.792921	0.805901	0.818882	0.831863
OK	0.560285	0.572077	0.583869	0.595662	0.614859	0.634056	0.653254
OR	0.695704	0.708985	0.722266	0.735548	0.749484	0.763419	0.777355
PA	0.782962	0.787160	0.791357	0.795554	0.802771	0.809987	0.817203
RI	0.769902	0.774114	0.778327	0.782539	0.790433	0.798328	0.806222
SC	0.595695	0.602024	0.608353	0.614682	0.629838	0.644994	0.660150
SD	0.685119	0.691775	0.698430	0.705085	0.718173	0.731262	0.744350
TN	0.599345	0.612452	0.625559	0.638666	0.660364	0.682062	0.703761
TX	0.575290	0.584847	0.594405	0.603962	0.620102	0.636241	0.652381
UT	0.709023	0.719890	0.730757	0.741624	0.751959	0.762294	0.772629
WA	0.654027	0.665926	0.677824	0.689723	0.700865	0.712007	0.723150
WV	0.586724	0.594435	0.602146	0.609857	0.625475	0.641092	0.656710
WI	0.782345	0.788219	0.794093	0.799967	0.811900	0.823832	0.835765
WY	0.640379	0.650606	0.660833	0.671060	0.680626	0.690191	0.699757
VT	0.766124	0.770915	0.775706	0.780497	0.787126	0.793756	0.800385
DMV	0.603516	0.610458	0.617400	0.624342	0.637745	0.651148	0.664551

APPENDIX 1 (Cont'd.)

State	1967	1968	1969	1970	1971	1972	1973
AL	0.678772	0.692567	0.695053	0.697538	0.704203	0.710868	0.725133
AK	0.368142	0.386118	0.385255	0.384391	0.413336	0.442281	0.485076
AR	0.698139	0.716645	0.723842	0.731039	0.722926	0.714813	0.714300
AZ	0.720490	0.734489	0.729648	0.724807	0.715507	0.706208	0.710758
CA	0.741917	0.755098	0.749439	0.743780	0.732022	0.720263	0.722354
CO	0.731596	0.742744	0.735053	0.727362	0.728247	0.729132	0.743867
CT	0.858316	0.867368	0.857260	0.847152	0.848245	0.849338	0.856931
DE	0.749321	0.768881	0.777131	0.785381	0.785772	0.786162	0.794153
FL	0.710619	0.740656	0.759382	0.778109	0.769193	0.760278	0.758962
GA	0.704745	0.721048	0.726040	0.731032	0.727694	0.724356	0.728617
HI	0.628657	0.652969	0.658441	0.663914	0.664878	0.665842	0.680656
ID	0.733178	0.744614	0.737209	0.729805	0.726579	0.723353	0.733977
IL	0.833887	0.842987	0.839278	0.835568	0.821208	0.806848	0.809488
IN	0.830967	0.841573	0.839370	0.837167	0.832555	0.827942	0.840330
IA	0.818715	0.830668	0.829812	0.828955	0.828154	0.827353	0.843551
KS	0.776052	0.789323	0.789785	0.790246	0.786936	0.783626	0.797317
KY	0.669449	0.689211	0.697663	0.706114	0.706670	0.707225	0.715381
LA	0.651463	0.667727	0.672681	0.677635	0.674463	0.671292	0.675721
ME	0.777753	0.786002	0.775090	0.764179	0.763827	0.763474	0.769622
MA	0.879666	0.890855	0.882885	0.874914	0.865396	0.855878	0.852860
MI	0.852271	0.865275	0.865469	0.865662	0.853855	0.842048	0.847241
MN	0.825520	0.837559	0.836787	0.836016	0.828725	0.821433	0.831142
MS	0.686529	0.704189	0.710540	0.716890	0.706502	0.696113	0.693324
MO	0.800201	0.812399	0.811787	0.811175	0.798015	0.784855	0.788695
MT	0.760901	0.774952	0.770163	0.765373	0.758258	0.751142	0.757876
NE	0.786413	0.799640	0.800057	0.800473	0.798341	0.796208	0.811076
NV	0.736029	0.751426	0.747983	0.744540	0.738398	0.732255	0.739963
NH	0.844882	0.855634	0.847225	0.838817	0.833553	0.828289	0.829524
NJ	0.818620	0.826116	0.814452	0.802789	0.806106	0.809422	0.819239
NM	0.615575	0.636245	0.638075	0.639905	0.629852	0.619800	0.623597
NY	0.825014	0.832494	0.820814	0.809133	0.802624	0.796114	0.796104
NC	0.700808	0.715799	0.719480	0.723162	0.727729	0.732297	0.744465
ND	0.754892	0.763155	0.758608	0.754061	0.751105	0.748148	0.752191
OH	0.844843	0.857824	0.857994	0.858165	0.847136	0.836108	0.842079
OK	0.672451	0.691648	0.699536	0.707423	0.704158	0.700893	0.705227
OR	0.791291	0.805227	0.800323	0.795418	0.784410	0.773402	0.776244
PA	0.824420	0.831636	0.819692	0.807748	0.807877	0.808006	0.814635
RI	0.814117	0.822011	0.810745	0.799480	0.799554	0.799628	0.806202
SC	0.675306	0.690462	0.694308	0.698154	0.700204	0.702254	0.711903
SD	0.757438	0.770526	0.770805	0.771083	0.766275	0.761466	0.773658
TN	0.725459	0.747157	0.757545	0.767933	0.763276	0.758620	0.761563
TX	0.668521	0.684661	0.689490	0.694320	0.689007	0.683695	0.685982
UT	0.782964	0.793299	0.784794	0.776289	0.778360	0.780432	0.796353
WA	0.734292	0.745435	0.737737	0.730040	0.725955	0.721870	0.731635
WV	0.672328	0.687946	0.692254	0.696561	0.705016	0.713471	0.729525
WI	0.847698	0.859631	0.858754	0.857877	0.852544	0.847211	0.858878
WY	0.709322	0.718888	0.709613	0.700339	0.702806	0.705274	0.721592
VT	0.807014	0.813644	0.801113	0.788583	0.786091	0.783600	0.787609
DMV	0.677954	0.691357	0.693451	0.695544	0.699534	0.703525	0.715116

**APPENDIX 1 (Cont'd.)**

State	1974	1975	1976
AL	0.739398	0.753663	0.767928
AK	0.527871	0.570666	0.613461
AR	0.713787	0.713274	0.712761
AZ	0.715308	0.719858	0.724409
CA	0.724445	0.726537	0.728628
CO	0.758602	0.773336	0.788071
CT	0.864524	0.872116	0.879709
DE	0.802144	0.810134	0.818125
FL	0.757647	0.756331	0.755016
GA	0.732879	0.737141	0.741402
HI	0.695470	0.710284	0.725098
ID	0.744601	0.755225	0.765849
IL	0.812127	0.814767	0.817407
IN	0.852718	0.865106	0.877493
IA	0.859750	0.875949	0.892147
KS	0.811007	0.824697	0.838388
KY	0.723536	0.731692	0.739847
LA	0.680149	0.684578	0.689007
ME	0.775770	0.781918	0.788065
MA	0.849842	0.846823	0.843805
MI	0.852434	0.857627	0.862820
MN	0.840851	0.850560	0.850268
MS	0.690535	0.687747	0.684958
MO	0.792535	0.796375	0.800215
MT	0.764610	0.771345	0.778079
NE	0.825943	0.840811	0.855679
NV	0.747671	0.755379	0.763087
NH	0.830760	0.831996	0.833232
NJ	0.829056	0.838873	0.848690
NM	0.627394	0.631191	0.634989
NY	0.796094	0.796084	0.796074
NC	0.756632	0.768800	0.780968
ND	0.776234	0.790278	0.804321
OH	0.848051	0.854022	0.859994
OK	0.709562	0.713897	0.718232
OR	0.779087	0.781929	0.784771
PA	0.821264	0.827893	0.834522
RI	0.812776	0.819350	0.825924
SC	0.721553	0.731203	0.740853
SD	0.785850	0.798042	0.810233
TN	0.764506	0.767450	0.770393
TX	0.688270	0.690557	0.692844
UT	0.812274	0.828195	0.844116
WA	0.741400	0.751165	0.760931
WV	0.745580	0.761635	0.777689
WI	0.870545	0.882212	0.893879
WY	0.737909	0.754227	0.770545
VT	0.791618	0.795627	0.799636
DMV	0.726707	0.738298	0.749889