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THE MINNESOTA ANTISELECTION MODEL

by

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This model arose from a project to evaluate the cost of a "health care access" program to provide comprehensive medical care to uninsureds in Minnesota, for the Minnesota Health Care Access Commission. The project was to provide estimates of the impact on per person and aggregate costs for various participation percentages in the access program. In order to evaluate those costs, the antiselection model described in the following report was developed.

While this model was developed specifically for the currently uninsured population in Minnesota, the principles can be easily applied to other populations. In fact, since the original model was developed, other versions have been used for various client situations. The results of the model appear to be reasonable. However, judgement is involved in choosing many of the assumptions used in the model, and this should be kept in mind when using the results. Over time, as data regarding such situations is accumulated, judgement can be gradually replaced by data.

There are a number of assumptions underlying the model. First, the model assumes that the size and composition of the covered population will be stable, and that its characteristics are therefore predictable. Under this assumption, and assuming a given level of prevailing costs of medical services, the cost of medical care for the entire uninsured population will be a fixed amount, representing the maximum possible aggregate cost for the program. Further, the expected costs for individual members of that population can be described using standard probability distributions.

It is assumed that the program exists in an environment where the eligible population may have a number of coverage choices available, but primarily there are two:

- They can choose coverage through the program being modeled, and
- They can choose to continue in their uninsured status.

Antiselection has been described as "that annoying tendency people have of doing what's best for themselves." This represents the ability of the eligibles with either high or low claim expectations to: 1) accurately predict their utilization, and 2) choose (or not) coverage in accordance with their best interest. Their best interest can be equated to *economic incentive*, which acts on both claim and premium expectations. On the claim side, people who expect a high level of claims are more likely to want coverage than people who expect a low level of claims. This incentive is enormously powerful, and its analysis and management is often a major part of a health actuary's job.

On the premium side, the economic incentives can be equally as powerful. If an eligible person is faced with paying a premium of significant size, they are likely to look for other coverage alternatives. In the Minnesota situation, they would be likely to look at insurance offered in the open market. If, for example, the market rates were to vary by age, sex, and/or area, and if the state program's rates did not, there would be a potential for widely disparate rates for equivalent risks, creating significant antiselection. It is natural to conclude that the greater the impact of the state's subsidy to premiums, the more this antiselection will be dampened, because the individual's premium under the access program will be that much less than the cost for coverage in the open market.

In developing the model, it was assumed that (1) the premiums would not be structured so as to promote significant antiselection by age, sex, or area, and (2) benefit or premium antiselection between the new program and the private sector would be avoided.

The Model: The model began with construction of a probability distribution of the medical care costs which might be expected from the uninsured population, based on the population's characteristics (including average health status) and the benefit design of the program. At the time the antiselection model was developed, it did not attempt to quantify the absolute level of the program's costs, because there were still too many unknowns. The model did, however, establish the *relative* sizes of the expected claims under different scenarios. Figure 1 is a rough depiction of the distribution we used. The actual distribution included many more sample values, and stretched out much further along the x axis of the graph. The x axis in Figure 1 is labeled "Size of Claim (Squeezed)." This reflects that, for this conceptual graph, we have taken a graph which might have stretched many feet off the page, and squeezed it horizontally to illustrate the concepts involved.

It is important to understand that the resulting distribution of claims represents the distribution we would expect *in the future* for this uninsured population, *if there is*

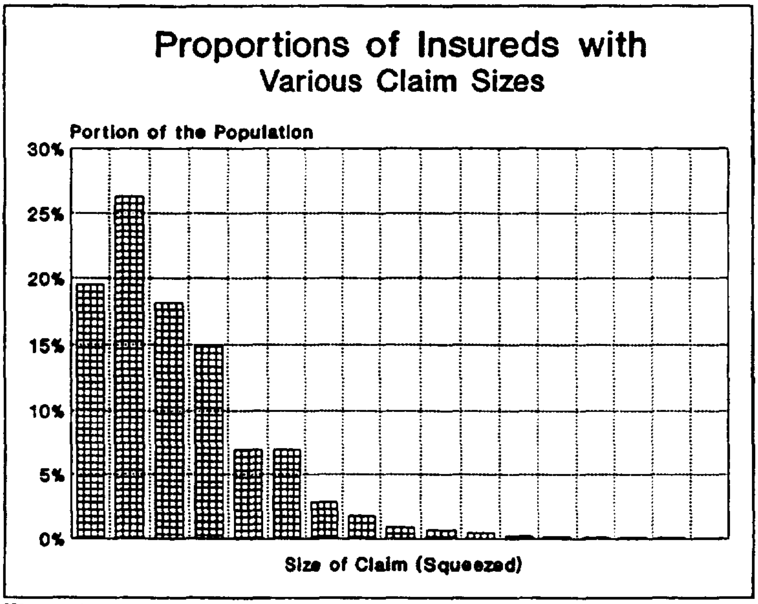

Figure 1

no antiselection, or equivalently, if the program successfully enrolls 100% of the uninsured population. The distribution has been derived from large employer group data, where we assumed there was no individual selection.

The existence and impact of antiselection varies because of many factors, including certain unmeasured (and perhaps unmeasurable) variables of human behavior. In a voluntary insurance environment, this behavior can and does result in less than 100% coverage. The model includes these factors in a simple way, using one variable: "penetration," defined as the portion of the eligible population which is covered by a program.

The model is based on the fundamental assumptions that:

- Some proportion of the insureds who will have larger or smaller than average claims (who we call high utilizers or low utilizers) will be able to predict those utilization levels, and

- Those who predict they will be high utilizers are more likely to seek voluntary coverage, while those who predict they will be low utilizers are less likely to seek coverage.

In order to facilitate the calculations, we took the spectrum of expected claims in Figure 1, and grouped them into two categories: low utilizers and high utilizers. (This choice of definition was somewhat arbitrary, but the results of the model are not very sensitive to this assumption.) Figure 2 illustrates the grouping, showing about 80% of the total population to be considered "low utilizers." The high utilizers correspond roughly to insureds with costs of $1,000-1,500 or more per year. The model can be easily expanded to include a larger number of partitions than the two we used.

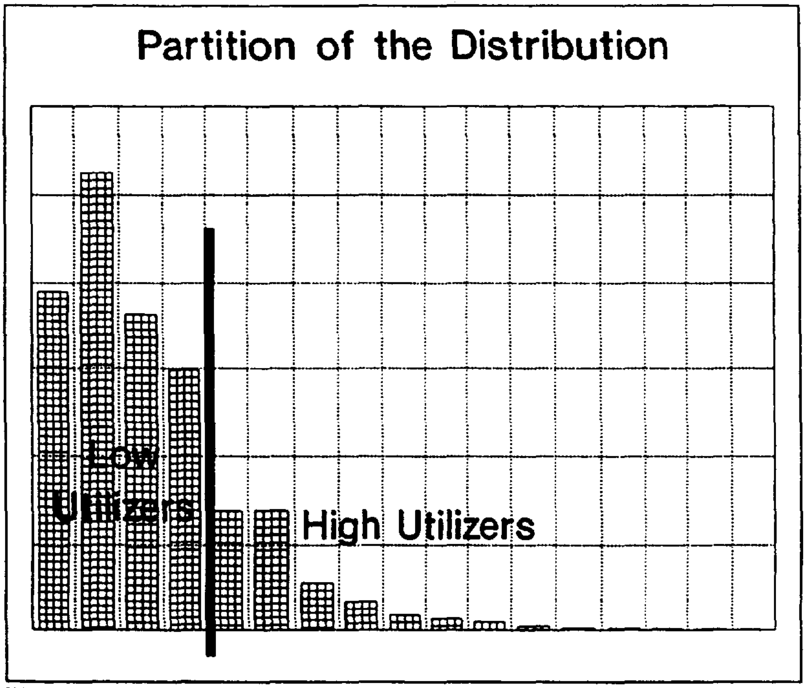

Figure 2

A Fully Antiselect Model: In order to understand the extreme possibilities of antiselection, we first modeled what would happen if the population were *fully antiselect*. This can be imagined as having the uninsured population line up in front of a door to begin enrolling for coverage. The order of the line is the uninsureds' perception of their expected claim level, starting with the person who expects the highest level of claims, and ending with those who expect zero claims. If the population were fully antiselect, they could perfectly predict their future claim levels, and the order of the line would match what will actually happen.

Imagine now that, as the line of uninsureds enters the door and enrolls, the door suddenly shuts when the given penetration percentage is reached. The population which hadn't passed through the door is not enrolled.

This line-up model was the essence of the starting calculation of the model, to measure the maximum possible antiselection which could theoretically occur. It is implemented by assuming that the insureds whose claims will fall above a certain level (to the right side of the probability distribution) can accurately predict the claims and thus will join the insured population. We then compared the average claim cost of the enrolled group to the average cost of the entire eligible population. The results of this calculation are shown in the following table, for a variety of penetration percentages:

Penetration	Maximum Relative Cost Factor
25%	3.507
50%	1.926
75%	1.326
100%	1.000

The table shows four representative penetration levels, for ease of exposition. In reality, the calculations can easily be done for a large number of penetration levels. The penetration level which would ultimately occur under the program will actually depend on many things, including the level of premium subsidy by the sponsoring organization. I have characterized qualitatively how a premium subsidy level might impact on penetration levels in the following table.

Conceptually, the penetration levels correspond to different enrollment requirements and state subsidies as follows:

Penetration	Enrollment	State Subsidy
25%	voluntary	low
50%	voluntary	medium
75%	voluntary	high
100%	mandatory	—

The Final Model: We know that the maximum relative cost factors shown above will produce an overstatement in the antiselection, for a number of reasons, including:

- While the maximum cost factors assume insureds can predict their own claims, some portion of the claim costs which will occur are unpredictable. This includes accidents as well as new illnesses. Thus, some portion of the insureds who predict themselves as low utilizers will not be correct.

- Correspondingly, there are an equivalent number of insureds who predict themselves as high utilizers, but who will not be. (The impact of this group must equate to that of the first group, since we are able to accurately predict the utilization of the group in total.)

- Some insureds will choose the insurance because they want the security of insurance itself, rather than a subsidy of known claims. (Some would argue this is the true purpose of insurance.)

In order to reflect these factors, the impact of antiselection was reduced by making some assumptions regarding the penetration of the high and low utilizing groups relative to the average. In keeping with the underlying assumptions, the penetration of the program among the high utilizers was assumed to be greater than that of the low utilizers, for a given level of overall penetration. Figure 3 illustrates our assumptions. In calculating these percentages, we chose the penetration of the high utilizers, and solved for the penetration of the low utilizers.

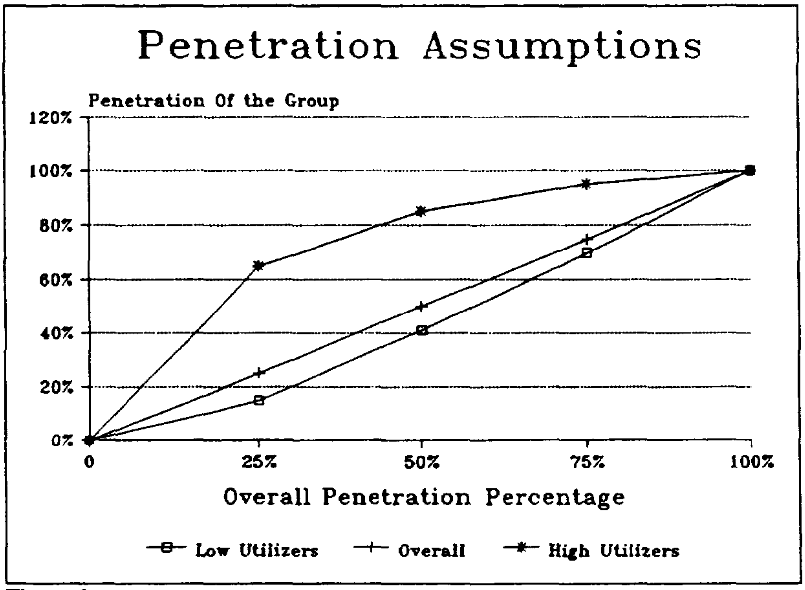

Figure 3

The following table shows the penetration percentages used:

Overall Penetration	Penetration of High Utilizers	Penetration of Low Utilizers
25%	65%	15%
50%	85%	41%
75%	95%	70%
100%	100%	100%

When the penetration percentages for a given penetration scenario are separately applied to the average costs of the low and high utilizers, we can calculate the costs expected from each of those populations. The sum of those costs provides the expected cost of the program for the given overall level of penetration. Dividing by the number of participants provides the relative cost of the four scenarios, relative to the 100% coverage (no antiselection) scenario. The relative costs are shown in the following table:

Overall Penetration	Expected Relative Claim Cost
25%	229%
50%	156%
75%	122%
100%	100%

Interpretation of the Results: It should be stressed that the numbers emerging from the model, when applied to the example described, represent one reasonable estimate of what might happen, out of a range of reasonable estimates which might have been made. Nevertheless, the results are useful in a number of ways.

The most useful aspect of the model to the practicing health actuary is that it describes boundary conditions for the possible antiselection values. It also permits sensitivity testing of alternative assumptions and scenarios. In testing alternative penetration (and thus partitioning) assumptions, we found that the results were relatively insensitive to those assumptions.

Application of the model to specific probability distributions could develop into some interesting theory, and perhaps ultimately develop into a parametric model or family of models.

When used in a public policy forum, the model helps in providing some guidance in policy decisions, as well as evaluation of the risks involved. It also points out the need for appropriate antiselection management in such a program. When used in a commercial insurance setting, it provides the practitioner a degree of confidence in the risk involved in the situation being studied.