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DURATION-BASED POLICY RESERVES

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ABSTRACT

Insurance companies, actuaries, and regulators have struggled to find a solution to the problems posed by durational or tiered rating strategies in individual and small-group insurance. This paper proposes a hypothesis that the negative public policy implications of durational rating strategies are caused by a lack of prefunding of durational deterioration of experience and constitute a failure to maintain an important part of the original insuring promise.

To solve the problem, a practical and simple reserving basis is proposed as a regulatory standard. The proposed standard deviates from current practice in two significant ways:

- It not only recognizes increasing costs by age of the insured, as do current methods, but also reflects increasing costs for two new factors: (1) aging of the insured's *coverage*, or durational effects, and (2) the excess of increasing cost of claims by calendar year (claim cost trend) over increasing premiums.
- It provides a dynamic methodology for adjusting for deviations of actual lapse rates from expected lapse rates and their resulting cumulative antiselection.

The proposed duration-based policy reserve method is consistent with reasonable public policy goals. Further, this method corrects certain existing inadequacies in current policy reserve methodologies and regulatory standards.

INTRODUCTION

Actuaries have long recognized that for newly underwritten coverages, expected costs will be lower at early durations; this has been true of most medically underwritten coverages, including both life and health coverage. Claim costs in this early "select" period are expected to increase over a relatively small number of years and then level off to an "ultimate" level. Experience studies are often structured to group all "ultimate" durations (those following the first few years) into one experience category that ignores policy duration.

Recently, there has been increasing awareness of longer-term durational effects, in both the individual and small-group medical insurance markets. This also has occurred in other markets with similar characteristics, such as individual term life insurance. Two characteristics are common to all the various markets: (1) many insurers have adopted a "select-and-ultimate" pricing methodology, at least in part, and (2) the insurance is subject to relatively high lapse rates.

In its pure form, the select-and-ultimate pricing methodology sets premiums in each year to fund only the claims expected in that year. There is no built-in element of premium to prefund the expected increase in claim costs by policy duration. Because of this, the increase in year-to-year premiums substantially exceeds the increase that would result only from claim cost trend and aging of the insured.

In the small-group health insurance market, versions of this methodology are called "durational" rating or "tiered" rating. Durational rating uses rate schedules that increase by policy duration. Tiered rating is a limited form of experience rating, in which a group is assigned a rate level, or "tier," based on prior experience. Tiered rating creates rates that tend to increase over time for an in-force block of business and has an impact similar to that of durational rating.

This rating practice has been perceived by some as a major reason for the uninsured population today. In fact, a major new model law has been adopted by the NAIC to limit the use of these rating techniques in small groups, and versions of it have been adopted or are being considered for adoption in many states.

The second characteristic of markets subject to long-term durational effects is that the lapse rates are relatively high. This indicates that a material portion of the policyholder population is mobile and "shops" the business.

In the small-group health insurance market, the employee group is shopped as a group. To the extent the group's premium rate is based on its expected average costs, a given individual's higher-than-expected costs are averaged over the group. This limits the impact of an individual's health status on the group's experience, relative to the group's total experience. This, in turn, limits the ability of such group policyholders to antiselect, in comparison to individual policyholders.

On the other hand, small-group policyholders tend to be more mobile, more aware, and more sophisticated in their purchasing decisions. This causes greater antiselection.

These two effects act simultaneously, but in opposite directions. They result in durational claim experience that starts relatively low in the first policy year and rises quickly by duration to substantially higher levels. This effect is similar, at least qualitatively, to that experienced in individual experience.

The select-and-ultimate rating methodology has two notable antiselective results, which combine to form the effect called cumulative antiselection, or CAST [2]:

(1) Premium rate levels on renewal business quickly rise significantly above the first year's select level. This encourages select risks to find other coverage elsewhere, where they can requalify as a select risk and pay lower premiums.
(2) As the select risks leave the rating pool, they leave behind a higher proportion of nonselect risks than would have been present without their departure.

CAST AND PUBLIC POLICY

I would propose that the fundamental purpose of medical insurance is the pooling of similar or homogeneous risks. In individual and small-group health insurance, a group of new policyholders presumably has been well underwritten and constitutes such a homogeneous group. Those who ultimately have claims are subsidized by those who do not. In one sense, the newly underwritten group can be thought of as *a homogeneous group sharing not only the risk of this year's claims, but also the risk that the health of any member of the group will deteriorate to a state of predictably higher-than-average expected costs.*

Thus membership in the original pool, and the resulting expected subsidy between its members, was part of the guarantee being purchased by the insured. To the extent a select-and-ultimate pricing methodology induces the healthier part of the pool to lapse, those healthy members are no longer subsidizing the unhealthy insureds on an ongoing basis. This can reasonably be considered an abrogation of the original insurance guarantee, especially to insureds whose health has deteriorated.

A natural solution to the problem is to have the original group of insureds *prefund* the deterioration expected to occur within the group. In that way, the experience of the group will not be hurt when the healthier

lives leave the group, because they will have already provided their contribution to health deterioration *in advance*. Duration-based policy reserves (DBPR) provide a mechanism for the lapsing healthy lives to prefund, during the time they are active, their subsidy of the unhealthy lives they may ultimately leave behind. This occurs through a specific assessment made during the early durations that is set aside to subsidize the experience of the later years.

If such reserves are mandated, they could conceivably be funded from company surplus, to be repaid in later years. More likely they would be funded from an incremental premium charge in the early years. Such a premium increase in early policy durations naturally would be accompanied by lower premiums in later durations.

THE FUNDAMENTAL PREMISES OF DBPR

Three factors contribute to the increasing cost of medical claims over time:

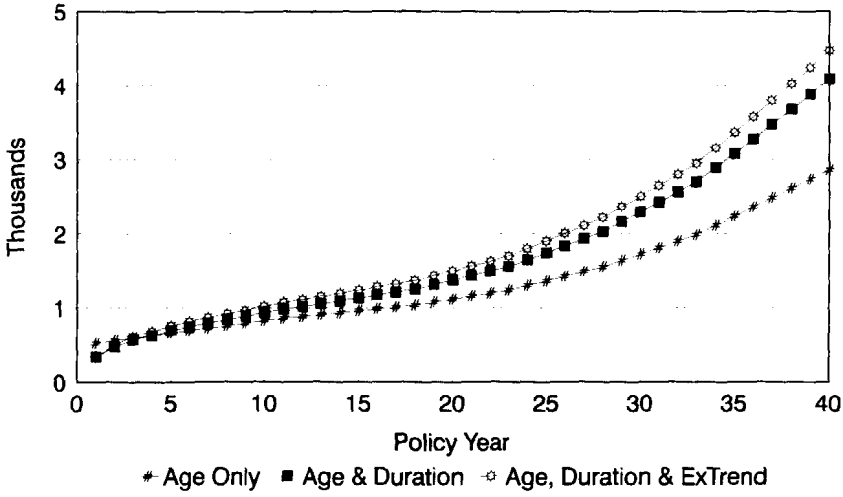
(1) The aging of the insured
(2) The aging of the insured's coverage (or durational effects)
(3) The increasing trend of claim costs by calendar year.

Duration-based policy reserves take all three factors into account. In addition, there is an assumption that premium rates can and will be increased in the future, to help offset the higher claim costs from these sources.

Figure 1 shows the claim cost curves that result from aging only, from aging and duration together, and from aging, duration, and trend, for a sample major medical policy issued to a new individual insured at age 25. The "age only" curve represents the claim costs based on assumptions consistent with today's policy reserve factor methodology and are based on typical age factors applied to an average claim cost of $1,000. The "age and duration" curve is similar, but adds durational factors representative of such a medically underwritten policy.

The "age, duration and trend" curve includes an assumed claim cost trend of 15 percent for each of the first 5 years, grading down to 5 percent in year 15 and later. This rate represents the underlying trend in medical costs. It includes the leveraging effects of the deductible and out-of-pocket provisions as well as other calendar-year factors that affect cost trends. (These include many external factors, such as changes in government programs, benefit changes, and others.) The values chosen

FIGURE 1
CLAIM COSTS



here are intended to be illustrative and not representative of trend at any given moment.

The "age, duration and trend" curve also reflects the practical necessity of a dampened claim trend over long periods. The claim costs in this curve also have been discounted in each year by the assumed cumulative premium increases. Those premium increases are 10 percent in each of the first two years and a percentage equal to the claim trend thereafter. Actually, the critical value is not as much the premium trend itself, but the *difference* between the claim cost trend and the premium trend. This difference is referred to as "excess trend."

The excess trend assumption is equivalent to an assumption that premium rate increases will fall slightly short of claim trend increases (5 percent of premiums in year 1 and an additional 5 percent in year 2) and remain slightly behind cumulative claim cost trends over the remaining life of the policy. This assumption, at least in a qualitative sense, plays a central role in the development of DBPR reserves. Based on my years of frustrating experience, it seems reasonable and prudent to assume that

an insurer will be unable to obtain approval for and implement rate increases for individual insurance on a timely basis for individual health insurance. This results in unanticipated shortfalls in revenue. It therefore seems reasonable to anticipate such shortfalls in policy-reserving methodology, in the interest of prudent reserve methodologies.

To translate the "aging, duration, and trend" claim cost curve of Figure 1 into its resulting policy reserve factors, two further assumptions are made: (1) a discount rate of 8 percent and (2) lapse rates beginning at 35 percent in year 1, scaling down to an ultimate rate of 18 percent. Figure 2 shows the terminal reserve factors corresponding to the claim cost assumptions in Figure 1, along with the premium assumptions mentioned above. These reserve factors can be considered natural reserves, flowing from the stated DBPR assumptions. The illustrated reserve factors in each curve have been divided by their corresponding cumulative premium rate level, to be consistent with each other (since they are based on different assumptions) and with Figure 1. This adjustment converts the reserve factors into "per $1 of premium" factors, rather than "per policy" factors.

FIGURE 2
RESERVE FACTORS

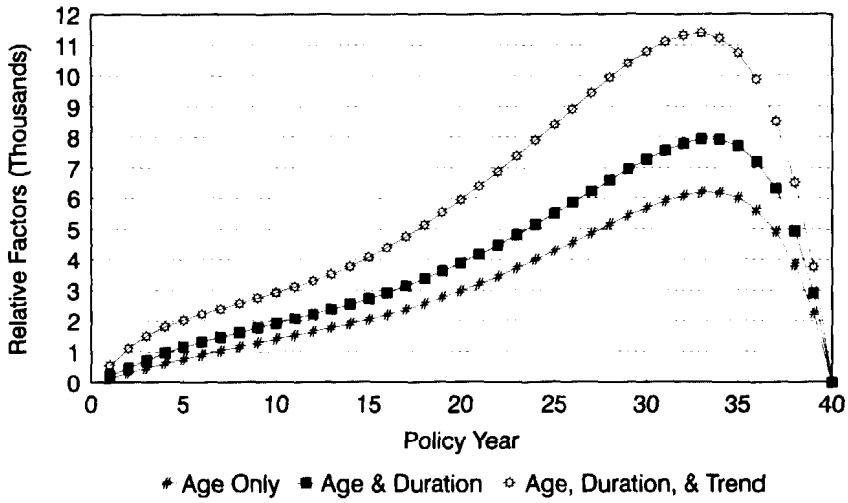
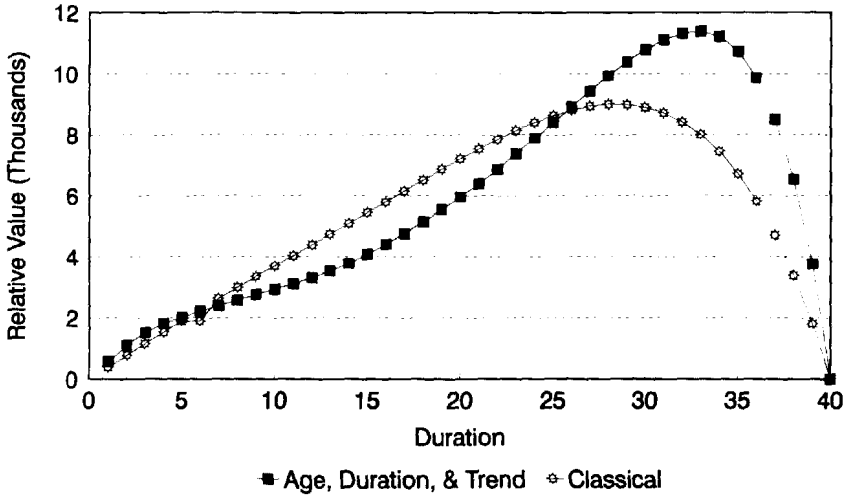


Figure 3 shows the "aging, duration, and trend" curve from Figure 2 (hereafter labeled DBPR), together with a "classical" curve. This curve represents the terminal reserve factors resulting from aging only, but with limited recognition of lapses. This curve is included to represent the policy reserve factors that would likely be calculated under current statutory reserve standards, on a net level basis.

FIGURE 3
RESERVE FACTORS
COMPARISON WITH CLASSICAL FACTORS



Figures 1 and 2 showed the substantial impact of including the additional assumptions made by DBPR. The resultant average claim costs, and the policy reserves that result from those claim costs, are highly leveraged over time by the excess trend. Even modest changes in this excess trend assumption can have a significant impact on the results.

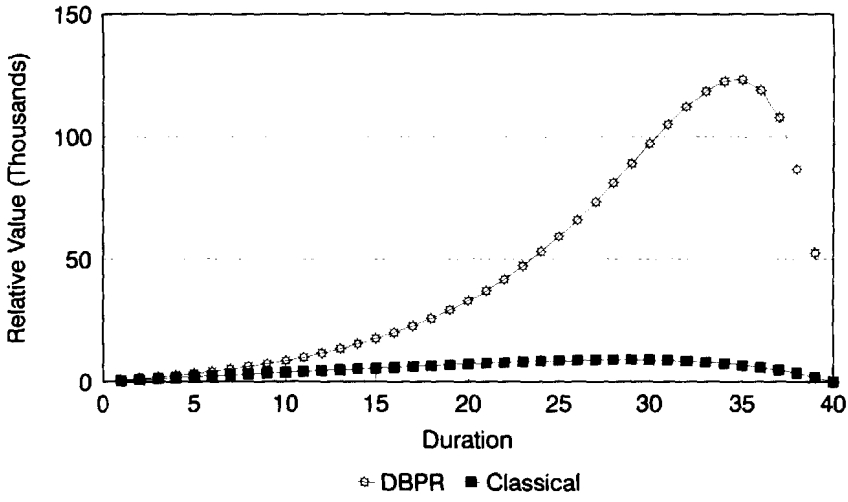
Figure 3 gives the appearance of DBPR reserve factors being comparable to classical reserve factors, but only because they have been restated to a "per $1 of premium" basis. If we lived in a world with no claim cost inflation and no need for comparable premium increases, they would, in fact, be similar. However, the DBPR reserves have been discounted by future premium increases, while the classical reserves have

not. If we look at actual differences in absolute reserve factors, we can see the real differences in absolute dollars.

Figure 4 shows the relationship of the curves in Figure 3, but without the artificial discounting by cumulative premium levels. Current reserving practice in the individual health market does not typically recognize premium increases after initial issue, making the comparison in Figure 4 a realistic one.

FIGURE 4

UNADJUSTED RESERVE FACTORS
COMPARISON WITH CLASSICAL FACTORS



As the figures have demonstrated, the inclusion of durational and excess trend factors can have a major impact on the level of projected future claim costs. Most actuaries seem to agree that they do exist, and they form a significant element of any realistic projection. Yet, they are ignored in policy reserve calculations by most individual and small-group insurers.

In my opinion, this failure to recognize durational and excess trend factors in setting reserves has been a major factor in the perennial problems and spiraling premium rates of these lines of business. This has led to the first premise of DBPR:

Duration and excess trend are appropriate subjects for prefunding through policy reserves, in the same way as policy reserves for policies with issue age premiums currently prefund for the aging of insureds.

This premise has a significant impact on not only the size but also the scope of policy reserves. Today, policy reserves are not held for most policies with attained-age premiums, including small-group policies. Because future premium rates are assumed to increase commensurately with claim costs, there is no prefunding of those increases.

Both trend and duration are generally ignored in current reserving standards and are not prefunded. This practice is equivalent to assuming that future premium increases will always be large enough to account for total increases in claim costs, regardless of the source and size of those increases. Typically, this requires premium trends at levels far exceeding the underlying cost trends and turns out to be impractical. This can result in major cumulative antiselection effects, sometimes leading to a classic assessment spiral, and an ultimate breakdown of the insurance mechanism.

The first DBPR premise implies that, to the extent future rate increases are limited to less than the combined impact of the three causes of increasing claims, *even policies with attained-age premiums require policy reserves for proper recognition of future cost increases.*

The principle of prefunding due to a limited ability to raise premium rates has already been embraced in at least one circumstance by the actuarial profession. The Actuarial Standards Board has adopted the following wording for the valuation of continuing care retirement communities [1]:

> A key element of the long-run viability of a CCRC is the expectation by residents that their periodic fee increases should approximately correspond to the community's inflation experience. The actuary should clearly state the assumption about future periodic fee increases. If the actuary uses assumed fee increases that exceed the expense inflation assumptions, the actuarial report and any actuarial opinion should identify any such excess and include appropriate comment.

Why wouldn't such disclosure be appropriate in the setting of reserves for individual and small-group medical insurance? The answer would

seem to be that it *is* appropriate, but that it has not been done because the assumptions are not explicit, as they are in gross premium valuations such as those for CCRCs. Rather, there is generally an implicit (and incorrect) assumption that premiums can be arbitrarily raised in the future to offset claim cost increases from all sources.

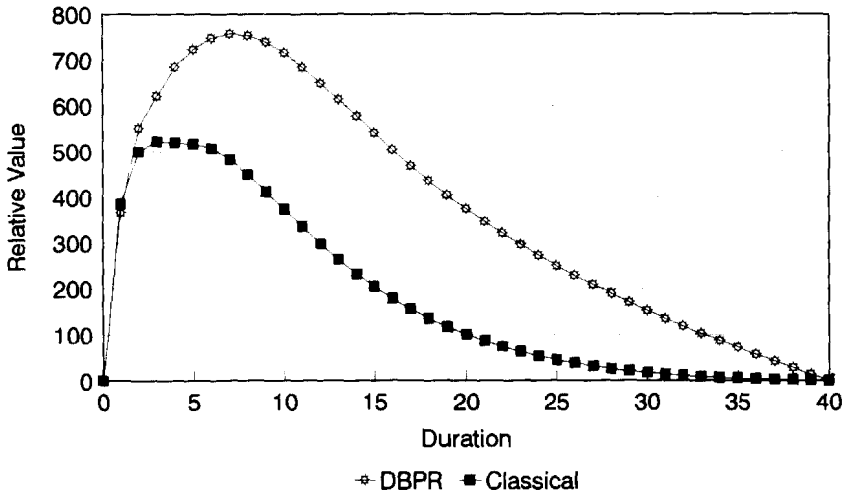
This issue raises an additional question, as has been mentioned earlier, one that is basic to the public policy of health insurance:

> *Is a premium strategy that uses future premium increases to fund durational deterioration an abrogation of the insurance principle and of the insurer's original pooling guarantee?*

DBPR methodology is consistent with an answer of "yes" to this question. Figure 5 illustrates the aggregate reserves that would be held for a block of policies by an insurer under the same two reserve bases as Figures 3 and 4. One curve is that described earlier as "age, duration, and trend" and here is called DBPR. Hereafter, this is called the "starting DBPR," because DBPR methodology makes further adjustments to this reserve.

FIGURE 5

AGGREGATE RESERVES



The other curve in Figure 5 is the classical statutory reserve, including the limited reflection of lapses currently allowed by the NAIC model regulation, "Minimum Reserve Standards for Individual and Group Health Insurance Contracts." The figure clearly shows the inadequacy of classical reserving methodology. If the modeled policy were on an attained-age basis, the differential would be even more marked, because tabular reserves would be zero under current standards, under most actuaries' definition of "level premium."

THE MECHANICS OF DBPR

DBPR calculations are fairly straightforward. The starting DBPR calculation has two steps. In the first step, the starting net premium (called P_x) is calculated as the quotient of the present value of future benefits (starting average cost C, times the age factor Y_{x+t}, times the durational factor D_t, times the claim trend factor T_t^C, times the number of persisting policyholders l_t, times the present value factor v^t, summed over all future years) divided by the present value of an increasing annuity that is based on the premium trend factor T_t^P. All the sums extend to the end of the table.

$$P_x = \frac{\left\{\sum_{t=0}^{\infty} C Y_{x+t} D_t T_t^C l_t v^t\right\}}{\left\{\sum_{t=0}^{\infty} T_t^P l_t v^t\right\}} \tag{1}$$

Equation (1) represents the premium value for a premium structure that levels premium by age, sometimes called "issue age" or "entry age" rating. The corresponding attained-age formula is:

$$P_x = \frac{\left\{\sum_{t=0}^{\infty} C Y_{x+t} D_t T_t^C l_t v^t\right\}}{\left\{\sum_{t=0}^{\infty} T_t^P Y_{x+t} l_t v^t\right\}} \tag{2}$$

To begin the calculation of DBPR reserves, we start with the starting DBPR reserve (*SV*), which is merely the difference at any point between the present value of future claims and the present value of future premiums. For the issue-age case:

$$ {}_sSV_x = \sum_{t=s}^{\infty} \{CY_{x+t}D_tT_t^C - P_xT_t^P\} l_t v^{t-s+1} \qquad (3) $$

The attained-age calculation is similar. Note that the aging factor Y and the durational factor D would typically have a single set of factors for each, which would be used directly. The trend factors T^C and T^P for each year, however, would typically be expressed as compound values of all preceding years' trends.

The reserve calculations used in DBPR reserves are a step closer to gross premium valuation reserves from current standards. Lapses, claim trends, and durational effects have been included in the DBPR, as they are in a gross premium valuation. The remaining major difference between DBPR and gross premium reserves arises from DBPR's use of net premiums rather than gross premiums.

The DBPR combination of variables is one of the two ways that DBPR deviates from past practice.

The second area of deviation involves the following premise, being the second fundamental premise of DBPR:

> *When actual lapses are higher than those assumed in the original reserve calculations, policy reserve factors for use in all future years should be increased to reflect the antiselective impact of those excess lapses.*

This premise arises from the public policy issue mentioned earlier—whether it is an abrogation of the insuring principle to use a durational rating and reserving philosophy and thereby fail to prefund cumulative antiselection.

The methodology proposed here to reflect this second premise is simple: increase all reserve factors for the remaining block, by a factor such that the aggregate reserves are unchanged from what they would have been if the expected lapse rates had been matched by actual lapse rates. This methodology is consistent with the concept of the excess lapsing

healthy insureds leaving behind their prefunded reserve dollars for the benefit of the persisting less healthy insureds, rather than having those reserves released into the carrier's profit stream.

Equivalently, the calculation can be made by holding a policy reserve based on the larger of (1) reserve factors applied to the actual persisting policyholders and (2) the originally expected reserve. The use of (1) ensures a minimum reserve basis comparable to current methods, while (2) holds additional amounts if actual lapses exceed expected lapses.

This simplified methodology does not produce exactly the same prospective reserves that would be produced under exact methods, but it does result in larger future reserves per policy than would otherwise be held, which might reasonably be considered an approximation for the antiselective future experience of the remaining policyholders. Perhaps more importantly, though, it is a retrospective reserve consistent with the insuring principle that all original members of the pool should share in the future deterioration of the pool.

The methodology is not intended to replace the gross premium valuation. It *is* intended to replace current factor methods of reserving and the current lack of standards for policies with attained-age premiums.

THE DBPR BASIS MORE RIGOROUSLY DEFINED

The DBPR methodology is a modified factor method for calculating policy reserves. It involves the following deviations from existing valuation standards.

Durational Effects

Durational factors are included in the calculation of future claim costs. The best source of such factors is not fully clear. Most pricing actuaries have their own factors, but very little has been actually published. If the DBPR method were adopted as a valuation standard, the most feasible source would be a single set of conservative factors for each broad type of benefit and category of underwriting. For example, individual major medical policies that are underwritten might have durational factors such as: 0.65, 0.85, 0.95, 1.00, 1.05, 1.1, and increasing linearly by 1 percent or 2 percent per year thereafter.

Research is under way to extract such factors from individual data, and the result should become generally available shortly. Small-group

data are already available through a Society of Actuaries research project [3].

Application of DBPR to group insurance presents an additional complication. Because small-group insurance is quite volatile, with in-force blocks quickly changing in size, lapse rates of group policies cannot be projected reliably. Also, while an individual policy has a naturally limiting duration when the insured reaches age 65 or dies, a group policy has no such natural limiting duration—it can go on forever.

However, if the duration of the *individuals* contained in the group were treated as the durational variable, a reasonable and consistent durational factor could be applied. This is the proposed method of application of DBPR to small-group insurance. However, this approach is not critical to the DBPR concept. This method could be considered as holding individual policy reserves under the group contract, similar to the concept used for group universal life policies.

Excess Trend Effects

Both claim and premium projections include trend assumptions, with an explicit differential between them. The choice of differential could depend on several factors including the regulatory climate.

The assumption in the example in this paper is that premium increases will fall 5 percent behind claim cost trends in year 1 and another 5 percent in year 2. After that, premium trends match claim trends.

Excess trend is included in the calculations by means of separate claim and premium trend assumptions.

Expected Lapsation

A conservative lapse assumption is allowed in the calculation of reserve factors. Without allowance for expected lapsation, the reserves resulting from inclusion of the first two effects would create enormous and redundant reserves. Such conservatism is not necessary, because the use of excess trend in the projection can build in conservatism, of appropriate duration and size, more effectively. The combination of assumptions under DBPR also corrects for the inappropriate early release of policy reserves due to lapsation.

An appropriate standard may already be contained in the current NAIC model valuation law, "Minimum Reserve Standards for Individual and

Group Health Insurance Contacts," for individual policies. That model has a maximum allowable termination rate of the lesser of (1) 8 percent and (2) 80 percent of the lapse rate used in pricing.

The limitation on lapses has not been included in the example in this paper, but that can be done easily.

Adjustment for Cumulative Antiselection

When lapsation is higher than assumed, the future reserve factors for that block would be adjusted by a factor that would offset the release in reserves that would have otherwise occurred. This aspect of DBPR might be the most controversial, but might also offer some hope for successful management of the business.

To calculate the reserve factors based on this adjustment, we let actual lapse rates be L_t^A and expected lapse rates L_t^E. A cumulative antiselection factor ($CAST_t$) can then be calculated for each year:

$$CAST_t = MAX\left\{\frac{1 - L_t^E}{1 - L_t^A}, 1\right\} \tag{4}$$

The final DBPR per policy reserve factor can then be expressed by the following equation:

$$DBPR_r = \sum_{t=r}^{\infty} \{CY_{x+t}D_tT_t^C - P_xT_t^P\}\left\{\prod_{s=1}^{t} CAST_s\right\} l_t v^{t-r+1} \tag{5}$$

SUMMARY, CONCLUSION AND PUBLIC POLICY IMPLICATIONS

The adoption of the DBPR method as a required valuation method would alleviate two major problems in the small-group and individual major medical market today:

1. It would force the prefunding of cumulative antiselection, because all original entrants to the block would be required to set aside money (as reserve liabilities) to subsidize the future health deterioration of those who become uninsurable. Otherwise, the company would have to subsidize the block through further capital investment.
2. Because insurers would be forced to fund the reserves, there would be upward pressure on early premiums. This would reduce the extent of the problematic durational or tiered pricing strategies required for competitiveness in today's market.

Based on the hypothesis that the originally insured pool shares not only the risk of a given year's claims but also the risk that their health will deteriorate to a predictably high-cost state, it seems appropriate to require prefunding of that deterioration of the pool.

Implementing the DBPR method can place considerable surplus strain on insurers writing large volumes of new business and would likely result in substantially higher premiums. Higher premiums are less competitive. For this reason, voluntary use of the DBPR method is unlikely. In addition, such reserves likely will not be deductible as tax reserves, unless and until they become an accepted minimum standard. The only solution would seem to be to adopt the DBPR method as a valuation standard for appropriate coverages, the most important of which is medical coverage.

Also, the prefunding of claim deterioration that is created by DBPR should be based on a reasonable and responsible public policy position that will produce socially desirable results. This is because the much criticized durational rating scheme will no longer be possible. The initial block of underwritten policies will be forced to subsidize the future claim deterioration of the block, and the insurer's initial insuring promise will be kept. For these reasons, these reserving concepts should be considered from the point of view of their possible impact on the market not only in the financial sense but also in a social responsibility sense.

My discussions with other actuaries on this subject have yielded consistently strong but differing opinions on the necessity and impact of the DBPR method. I expect that this proposal will generate some debate, but perhaps it is time such debate occurred.

REFERENCES

1. ACTUARIAL STANDARDS BOARD. "Relating to Continuing Care Retirement Communities," *Actuarial Standard of Practice No. 3*. Washington, D.C.: 1990.
2. BLUHM, WILLIAM F. "Cumulative Antiselection Theory," *TSA* XXXIV (1982): 215–46.
3. BRINK, STEPHEN D., MODAFF, JAMES C., AND SHERMAN, STEVEN J. "Variation by Duration in Small Group Medical Insurance Claims," *TSA 1991-92 Reports:* 333–82.

APPENDIX

TABLE A-1

SAMPLE CALCULATIONS

(1) Duration	(2) Attained Age	(3) Starting Claim Cost	(4) Claim Trend Factor	(5) Accum'd Claim Trend	(6) Claim Cost with Inflation	(7) Durational Factors
1	25	522.50	15.00%	1.0000	522.50	0.65
2	26	556.25	15.00	1.1500	639.69	0.85
3	27	590.00	15.00	1.3225	780.28	0.95
4	28	623.75	15.00	1.5209	948.65	1.00
5	29	657.50	15.00	1.7490	1,149.97	1.05
6	30	691.25	14.00	2.0114	1,390.35	1.08
7	31	725.00	13.00	2.2929	1,662.39	1.10
8	32	758.75	12.00	2.5910	1,965.94	1.11
9	33	792.50	11.00	2.9020	2,299.80	1.12
10	34	826.25	10.00	3.2212	2,661.49	1.13
11	35	860.00	9.00	3.5433	3,047.23	1.14
12	36	885.00	8.00	3.8622	3,418.03	1.15
13	37	910.00	7.00	4.1712	3,795.75	1.16
14	38	935.00	6.00	4.4631	4,173.03	1.17
15	39	960.00	5.00	4.7309	4,541.69	1.18
16	40	985.00	5.00	4.9675	4,892.96	1.19
17	41	1,010.00	5.00	5.2158	5,268.00	1.20
18	42	1,035.00	5.00	5.4766	5,668.32	1.21
19	43	1,075.00	5.00	5.7505	6,181.75	1.22
20	44	1,115.00	5.00	6.0380	6,732.36	1.23
21	45	1,155.00	5.00	6.3399	7,322.58	1.24
22	46	1,195.00	5.00	6.6569	7,954.98	1.25
23	47	1,235.00	5.00	6.9897	8,632.32	1.26
24	48	1,298.00	5.00	7.3392	9,526.30	1.27
25	49	1,361.00	5.00	7.7062	10,488.11	1.28
26	50	1,424.00	5.00	8.0915	11,522.28	1.29
27	51	1,487.00	5.00	8.4961	12,633.64	1.30
28	52	1,550.00	5.00	8.9209	13,827.34	1.31
29	53	1,637.00	5.00	9.3669	15,333.63	1.32
30	54	1,724.00	5.00	9.8353	16,955.98	1.33
31	55	1,811.00	5.00	10.3270	18,702.23	1.34
32	56	1,898.00	5.00	10.8434	20,580.71	1.35
33	57	1,985.00	5.00	11.3855	22,600.29	1.36
34	58	2,110.00	5.00	11.9548	25,224.65	1.37
35	59	2,235.00	5.00	12.5526	28,054.96	1.38
36	60	2,360.00	5.00	13.1802	31,105.23	1.39
37	61	2,485.00	5.00	13.8392	34,390.39	1.40
38	62	2,610.00	5.00	14.5311	37,926.30	1.41
39	63	2,735.00	5.00	15.2577	41,729.83	1.42
40	64	2,860.00	5.00	16.0206	45,818.89	1.43

TABLE A-1—*Continued*

(1) Duration	(8) Durational Claim Cost	(9) Discount Factor	(10) Lapse Rates	(11) No. of Policies Left	(12) PV Expected CC	(13) PartSum PVF CC	(14) Increase Factor
1	339.63	1.0000	0.35	1.0000	339.63	3,241.76	10.00
2	543.73	0.9259	0.30	0.6500	327.25	2,902.14	10.00
3	741.26	0.8573	0.25	0.4550	289.16	2,574.89	15.00
4	948.65	0.7938	0.20	0.3413	256.98	2,285.73	15.00
5	1,207.47	0.7350	0.18	0.2730	242.29	2,028.75	15.00
6	1,501.58	0.6806	0.18	0.2239	228.77	1,786.45	14.00
7	1,828.63	0.6302	0.18	0.1836	211.53	1,557.68	13.00
8	2,182.20	0.5835	0.18	0.1505	191.66	1,346.15	12.00
9	2,575.77	0.5403	0.18	0.1234	171.77	1,154.49	11.00
10	3,007.48	0.5002	0.18	0.1012	152.27	982.72	10.00
11	3,473.84	0.4632	0.18	0.0830	133.54	830.45	9.00
12	3,930.74	0.4289	0.18	0.0681	114.73	696.91	8.00
13	4,403.07	0.3971	0.18	0.0558	97.58	582.18	7.00
14	4,882.45	0.3677	0.18	0.0458	82.15	484.60	6.00
15	5,359.19	0.3405	0.18	0.0375	68.46	402.45	5.00
16	5,822.62	0.3152	0.18	0.0308	56.48	333.99	5.00
17	6,321.60	0.2919	0.18	0.0252	46.56	277.51	5.00
18	6,858.67	0.2703	0.18	0.0207	38.35	230.95	5.00
19	7,541.74	0.2502	0.18	0.0170	32.02	192.60	5.00
20	8,280.80	0.2317	0.18	0.0139	26.69	160.58	5.00
21	9,079.99	0.2145	0.18	0.0114	22.22	133.89	5.00
22	9,943.72	0.1987	0.18	0.0094	18.48	111.67	5.00
23	10,876.72	0.1839	0.18	0.0077	15.35	93.19	5.00
24	12,098.41	0.1703	0.18	0.0063	12.96	77.84	5.00
25	13,424.78	0.1577	0.18	0.0052	10.92	64.88	5.00
26	14,863.74	0.1460	0.18	0.0042	9.18	53.97	5.00
27	16,423.74	0.1352	0.18	0.0035	7.70	44.79	5.00
28	18,113.82	0.1252	0.18	0.0028	6.45	37.09	5.00
29	20,240.39	0.1159	0.18	0.0023	5.47	30.64	5.00
30	22,551.45	0.1073	0.18	0.0019	4.63	25.17	5.00
31	25,060.98	0.0994	0.18	0.0016	3.90	20.54	5.00
32	27,783.96	0.0920	0.18	0.0013	3.29	16.63	5.00
33	30,736.39	0.0852	0.18	0.0011	2.76	13.35	5.00
34	34,557.78	0.0789	0.18	0.0009	2.36	10.59	5.00
35	38,715.84	0.0730	0.18	0.0007	2.00	8.23	5.00
36	43,236.26	0.0676	0.18	0.0006	1.70	6.22	5.00
37	48,146.54	0.0626	0.18	0.0005	1.44	4.52	5.00
38	53,476.08	0.0580	0.18	0.0004	1.21	3.09	5.00
39	59,256.35	0.0537	0.18	0.0003	1.02	1.88	5.00
40	65,521.02	0.0497	0.18	0.0003	0.86	0.86	5.00

TABLE A-1—*Continued*

(1) Duration	(15) Accum'd Premium Factor	(16) PVF Premium	(17) PartSum PVF Premium	(18) ART Premium	(19) Net Premium	(20) DBPR = PVFB − PVFP	(21) Aggregate DBPR Reserve
1	1.0000	$1.00	$4.54	$339.63	$713.63	564.93	367.21
2	1.1000	0.66	3.54	494.30		1,100.00	550.55
3	1.2100	0.47	2.88	612.61		1,503.89	620.97
4	1.3915	0.38	2.41	681.74		1,802.86	684.87
5	1.6002	0.32	2.03	754.56		2,017.91	722.87
6	1.8403	0.28	1.71	815.96		2,213.12	747.61
7	2.0979	0.24	1.43	871.65		2,395.33	756.40
8	2.3706	0.21	1.19	920.52		2,573.52	753.02
9	2.6551	0.18	0.98	970.12		2,749.27	738.80
10	2.9472	0.15	0.80	1,020.47		2,924.42	715.30
11	3.2419	0.12	0.65	1,071.55		3,101.16	684.20
12	3.5336	0.10	0.53	1,112.38		3,295.63	649.88
13	3.8163	0.08	0.43	1,153.74		3,514.89	613.83
14	4.0835	0.07	0.34	1,195.66		3,768.39	577.41
15	4.3285	0.06	0.27	1,238.12		4,069.00	541.92
16	4.5449	0.04	0.22	1,281.13		4,392.13	503.65
17	4.7722	0.04	0.17	1,324.69		4,742.81	468.27
18	5.0108	0.03	0.14	1,368.79		5,127.37	435.87
19	5.2613	0.02	0.11	1,433.44		5,528.66	404.65
20	5.5244	0.02	0.09	1,498.96		5,949.82	374.95
21	5.8006	0.01	0.07	1,565.36		6,394.82	346.97
22	6.0906	0.01	0.06	1,632.63		6,868.62	320.88
23	6.3951	0.01	0.04	1,700.78		7,377.46	296.74
24	6.7149	0.01	0.03	1,801.73		7,889.09	273.22
25	7.0506	0.01	0.03	1,904.05		8,402.52	250.55
26	7.4032	0.00	0.02	2,007.75		8,916.46	228.92
27	7.7733	0.00	0.02	2,112.83		9,429.32	208.43
28	8.1620	0.00	0.01	2,219.29		9,939.09	189.16
29	8.5701	0.00	0.01	2,361.74		10,399.83	170.42
30	8.9986	0.00	0.01	2,506.10		10,796.68	152.33
31	9.4485	0.00	0.01	2,652.37		11,111.01	134.98
32	9.9210	0.00	0.01	2,800.53		11,319.45	118.39
33	10.4170	0.00	0.00	2,950.60		11,392.66	102.60
34	10.9379	0.00	0.00	3,159.46		11,222.50	87.02
35	11.4848	0.00	0.00	3,371.06		10,743.64	71.72
36	12.0590	0.00	0.00	3,585.40		9,874.14	56.76
37	12.6619	0.00	0.00	3,802.46		8,511.18	42.12
38	13.2950	0.00	0.00	4,022.26		6,525.86	27.81
39	13.9598	0.00	0.00	4,244.79		3,756.42	13.78
40	14.6578	0.00	0.00	4,470.05			0.00

Formulas Used in the Sample Calculations

(1) = Duration
(2) = 24 + (1)
(3) = Starting (age-based) claim costs. Scaled to an arbitrary level.
(4) = Assumed

$$(5)_t = \begin{cases} 1.000 & \text{for } t = 1 \\ \prod_{s=1}^{t-1} [1 + (4)_s] & \text{for } t > 1 \end{cases}$$

(6) = (3) × (5)
(7) = Assumed
(8) = (6) × (7)
$(9)_t = 1.08^{1-t}$
(10) = Assumed

$$(11)_t = \begin{cases} 1.000 & \text{for } t = 1 \\ \prod_{s=1}^{t-1} [1 - (10)_s] & \text{for } t > 1 \end{cases}$$

(12) = (8) × (9) × (11)

$$(13)_t = \sum_{s=t}^{40} (12)_s$$

(14) = Assumed

$$(15)_t = \prod_{s=1}^{t-1} [1 + (14)_s]$$

(16) = (15) × (9) × (11)

$$(17)_t = \sum_{s=t}^{40} (16)_s$$

$$(18) = (12)/(16)$$
$$(19)_1 = (13)_1/(17)_1$$
$$(20) = [(13)_{t+1} - (19)_1 \times (17)_{t+1}]/[(9)_{t+1} \times (11)_{t+1} \times (15)_{t+1}]$$
$$(21) = (20) \times (11)_{t+1} \times (15)_t$$

DISCUSSION OF PRECEDING PAPER

E. PAUL BARNHART:

Bill Bluhm has written another fine paper, and an important one, following up on his original paper on cumulative antiselection [*TSA* XXXIV (1982): 215].

I particularly thank him for his comments on public policy and the desirability of prefunding antiselection through increased original premiums and associated stronger policy reserves that take durational effects into account.

In the last several years, the position of many state regulators has veered increasingly away from premium and reserve adequacy with respect to individual health insurance. Some regulators have gone to the point of attempting to constrict "level" premium rates, in effect, to little more than current one-year term, not allowing for claim costs increasing by age, let alone costs increasing as a result of inflationary trend or anti-select persistency.

I hope that regulatory actuaries will study this paper with open and receptive minds.

MARK D. J. EVANS:

Mr. Bluhm proposes a hypothesis in his Abstract and then proceeds to offer strong support of the hypothesis in his paper. He then proposes a solution for the problem outlined in his hypothesis. Because this is an initial effort, refinements should be expected prior to implementation of a regulatory standard.

In the introduction, Mr. Bluhm mentions "that a material portion of the policyholder population is mobile and 'shops' the business." It is important to bear in mind that lapses can be due to any number of factors: economic difficulty, poor service, change in customer needs or status, or buyer's remorse. In some markets there is evidence to suggest that the same stability and other characteristics that enable a policyholder to pay premiums and remain persistent can also cause the policyholder to be a better risk due to that same stability (that is, some of the same factors that cause a policyholder to be a high risk for a claim also cause the policyholder to be at a higher risk for a lapse). As such, lapsation can actually serve as a means to weed out bad risks. For this and other reasons, there will be some bad risks who do lapse. Thus, Mr. Bluhm's

proposal to maintain aggregate reserves at the level they would have been if excess lapses had not occurred is inappropriately conservative. To help illustrate this, consider a group of policies that for whatever reason terminate before expected except for one lone policy. Under Mr. Bluhm's formula, one can easily imagine a situation in which the last policy would have a reserve far in excess of anything that anyone would judge to be reasonable.

A more refined procedure is needed to produce reasonable results. Such an approach should allow for several variables that must consider such things as the following:

1. Customer behavior will vary widely by product, market, and level of customer sophistication.
2. Extra lapses at the time of rate increases can be expected to be a function of the percentage change in the rate increase.
3. The length of the effects of antiselection at the point of rate increase can vary by the type of product and so on.
4. If lapses are high and premiums are due more frequently than annually, it may be important to precisely reflect nonannual premium payments and so on. Fortunately with modern computing techniques this process is fairly straightforward.

CHARLES FUHRER:

Mr. Bluhm should be commended for an important paper. The inclusion of durational and excess trend in policy reserves is an excellent idea, with which I completely agree. The importance and value of this approach for the ongoing viability of individual and small-group health insurance should not be underestimated. I also agree with the premise that policy reserves should be adjusted to reflect actual experience versus pricing assumptions. I disagree only with the methodology for accomplishing this.

The paper presents two distinct calculation methods. The calculation of the duration-based policy reserves (DBPR) in Equations (4) and (5) clearly indicates that the CAST is to be applied to the present value of future claims in the prospective reserve calculation. Thus, the claims are adjusted up to what they would have been if there had been no excess lapses. This is equivalent to the assumption that all policyholders whose lapsation rate exceeds the assumed rate will have zero claims. The author presents a different calculation in the third and fourth paragraphs from the end of the section entitled "The Mechanics of DBPR." He says,

"increase all reserve factors . . . by a factor such that the aggregate reserves are unchanged from what they would have been if the expected lapses had been matched by actual lapses rates." This method would produce lower reserves than Equation (5). I assume that the author meant the methodology of Equation (5). Also, it was unclear whether Equation (4) is calculated over all policies and all issue ages.

I believe two possible modifications are applicable here:

1. It may be appropriate to adjust policy reserves for actual claim experience as well as for excess lapses. Assume that a company found that its policies had very high claims compared to the pricing assumptions. The policy reserves should be increased to reflect this higher claim level. The amount of the adjustment could be reduced by the credibility of the claim experience.
2. The author's adjustment may overstate the antiselective effect of excess lapsation. Excess lapsation does not necessarily lead to more antiselection. Perhaps the expected lapses already allow for all the better risks lapsing. I would prefer to make some explicit assumptions on the distribution of lapse levels as a function of policyholder health, and then calculate the antiselective effect of actual lapses using a Bayesian approach. The author essentially assumes that all excess lapsing policyholders will have zero claims in all future years. Even the currently healthiest individuals have significant probability of having health claims in even the near future. Furthermore, for smaller companies, with small blocks of business, there is a significant probability that the CAST factor will be extremely high. For example, if one of two remaining policyholders lapses at a duration at which the lapse rate is 10 percent, the CAST factor for that duration would be 1.8.

CHARLES HABECK:

In this paper on policy reserves for health insurance, William Bluhm continues to explore the issues raised in his previous paper "Cumulative Antiselection Theory" [*TSA* XXXIV (1982): 215]. The comments in my discussion of the earlier paper are, in general, still valid; many of them also would apply here without change. However, I note a major difference between the two papers: whereas the earlier CAST paper included some discussion of loss ratios and gross premiums, little or no time is spent here to show the financial impacts of the proposed "duration-based policy reserve" methodology.

The reader can expect to see significantly higher gross premiums come out of the DBPR method, as was the case in the CAST paper. But it would be most helpful to get an idea, for instance, of loss ratio progression by policy year, as was possible with the first paper. Examples such as those presented there would not only add to the understanding of insurers who will need to decide whether an early, unanticipated rate increase is needed, but also prepare insurance regulators to expect requests for rate increases based on lower early cash loss ratios than previously have been seen as acceptable.

Reference could also have been made to current actuarial practice for GAAP benefit reserves for major medical insurance as commonly rated. Some insurers establish GAAP benefit reserves to reflect the wearing off of initial selection, even with attained-age rating, just as Mr. Bluhm proposes. But the term period for this calculation tends to be only a few years.

Although the paper is timely and takes up a persistent problem for actuaries, nevertheless it raises questions in two areas: first, the author's justification for imposing such a radical solution to the perceived rating problem does not bear up well under scrutiny; and second, the solution itself is not nearly so "practical and simple" as he describes it in his opening summary remarks.

As to the justification for his proposed solution, Mr. Bluhm appears to believe that insureds who lapse their major medical coverage, especially in the early years, have violated some commitment they made when they bought the policy. I cannot think of any other kind of insurance for which anyone would advance such a proposition. I do not find it in the contract language. The insured can typically end coverage at will, by giving notice or simply by not paying the premium before the end of the grace period. As noted by W. H. Odell:

> The insurance contract is unilateral; the insurance company promises to perform in a certain manner as long as premiums are paid. Generally, there is no promise made by the policyholder. [*TSA* XXXVII (1985): 68]

Some relief from early lapses has resulted from the development of the short-term major medical policy for sale to persons with a short-term need. But for others it is not always clear at the outset that the need will be short term.

A further assumption is that it will be the healthy lives that will tend to lapse and thus "unfairly" drop out of the original pool of risks. This assertion requires substantiation. Insured persons, healthy or not, may leave such a pool, however it may be defined, when gross premiums rise and they find they can get cheaper coverage elsewhere. Another choice is to go without "insurance" as such, in which case individuals become "self-insured," just like many large corporate employers.

An insured could obtain new group coverage through employment or marriage. Some claimants may reach the plan maximum; others may die. Young persons may stay out of the pool because of the cost; likewise, older persons may retire early before they are eligible for Medicare. Thus, people drop their policies for a variety of reasons that defy facile classification.

Whatever the reason, healthy lives, by definition, will have had very low or even no claims at all up to the time they lapse. In the current debate on health care financing reform, these healthy lives are being accused by certain proponents of such reform of not paying their fair share of health costs. These reformers would compel them to buy into the system at community rates, not at all an equitable solution, but at least a simple one. This view seems to echo the author's call for an additional contribution from them in the form of higher early premiums to prefund the higher claims that are sure to occur in later policy durations.

In light of these considerations, Mr. Bluhm's basic premise takes on a rather tenuous quality and cannot be accepted as sufficient justification for attempts to produce "socially desirable results" by means of more leveling in the calculation of gross premiums. Possibly it would bolster his position if he were to clarify the concept of "original insuring promise" and also would define what constitutes the "original pool"; the latter can have several meanings, ranging from "plan code by year of issue" all the way to "all medical expense policies issued in a policy series."

The author says his solution is "practical and simple"; the calculations are said to be "straightforward." I reviewed the text and the sample calculations several times without achieving enough confidence in my understanding of the method to allow me to concur in Mr. Bluhm's view.

A single cell is developed for an individual major medical plan issued at age 25, with an average cost of $1,000. Figure 1 [in the paper] shows the age-specific claim cost factors, along with adjusted claim costs that reflect inflation and antiselection, over the 40-year potential life of the

policy. The adjustments have been dampened to take into account the ongoing management of premium rate levels.

Next, in Figure 2 [in the paper], we see policy reserve factors for the three sets of assumptions, again with dampening done by dividing the reserve factor by the corresponding cumulative premium rate level. The comparison purports to show the inadequacy of policy reserves "under current statutory reserve standards, on a net level basis."

It is not clear why the net level premium valuation basis should be considered appropriate for comprehensive major medical policy reserves, when this type of policy uses attained-age premium structures as a rule. The most common practice is for gross premiums to increase stepwise by attained age and policy year. The text of the paper and the various charts do not make the connection or consider the impact of the proposed method in a realistic setting.

Next, I reviewed the calculations in the Appendix of the paper to improve my understanding and complete my review. My specific comments are followed by general remarks.

1. The reserve calculation is for a single cell, issue age 25, major medical benefits, deductible not stated. Other cells like this would be needed for other issue ages and plans. Each year of issue would require its own calculation of the DBPR.
2. Actuarial judgment, with some empirical support, enters into those columns labeled "Assumed" in the formulas for the calculations. These are: claim trend factors, durational factors, interest discount rate, lapse rates, and premium increase factors. The lag in getting rate increases into effect is especially subjective; yet this lag is the heart of the method, the basic rationale for the entire process. [Note that column (10), "Lapse Rates," probably should be headed "Total Decrement Rates" to include deaths.]
3. The interest discount rate of 8 percent also is a subjective choice for the actuary; here it remains constant for the entire 40-year period.
4. Most of the remaining columns are "derived" values, found by use of the formulas provided by the author. To what extent does the author envision policy reserve factors stated as a percentage of gross premiums?
5. Column (18), "ART Premiums," seems to lack function or meaning in the reserve calculation. The more usual ART net premium per unit in force simply would be the claim cost found in column (8), before it is divided by column (15) to get column (18).

A useful comparison can be made of columns (8) and (20) since both amounts seem to be per unit in force. The DBPR in column (20) seems to require amounts in excess of the durational claim costs in column (8) for the first two durations, as it builds up to a fund that is more than twice that annual cost. (Can this be correct?)

By the tenth duration, the DBPR has come down to about 97 percent of the durational claim cost. Assuming that a given policy is priced to be self-sufficient, that is, not a loss leader, it is unclear at what duration the policy in this illustration can be expected to break even. That is why we must see actual gross premiums that would be used with the DBPR reserve method, compared to gross premiums that do not use such a method.

In discussing the choice of the lapse assumption, or total decrement rate, the author takes note of the limitation in the NAIC model valuation law. He points out that if assumed lapses are set too low, because of the 8 percent limit for instance, the resulting reserves produced by the DBPR method will be enormous. The inclusion in the reserve calculation of trend and durational factors requires "appropriate" lapse rates to prevent such high reserves, he says.

Apparently Mr. Bluhm has an idea of what would be the proper level of conservatism, one that would also control the "inappropriate early release of policy reserves due to lapsation." He provides a CAST adjustment, to prevent such early release and to help manage the business. This adjustment is cumulative and must be calculated each year. Presumably the actuary would compare the actual decrements to the expected for different age groups and the various plans. Reserves would be increased to restore the phantom lives.

This process could work if carried out by an experienced health actuary, using a worksheet approach to produce an estimate of the shortfall. This approach already is used in projections prepared to support rate increase filings, but of course without detailed formulas and models. If a strong element of subjectivity is going to be required, it seems preferable to estimate only one or two factors or trends over the near term, rather than to try to create a complex model that must be manipulated anyway to obtain results that are deemed reasonable.

When all the DBPR calculations have been reviewed, we are left with the same general question as at the start, that is, what are the financial implications of this approach to reserve strengthening? Of particular concern for the line manager is how to keep from falling behind in getting

rate increases on this volatile insurance product. I have known of four major insurance companies that filed re-rating formulas in advance with regulators to avoid delays and to be able to update premiums on a regular basis, usually once a year. Of these four companies, only one still markets individual major medical insurance.

On the other hand, if such rate approval delays are common, and everyone knows of them, why wouldn't the experienced actuary make allowances for them in the rate-setting process?

This problem has been around since the early 1970s, when price controls and the fear of national health insurance caused companies to reduce guarantees, shift to step rates, and finally settle on annually increasing premiums, with no policy reserves. Since the advent of Medicare in 1965, there has been this lingering question about who gets the reserves that are released in the event of massive changes in the health system. The DBPR reserve would raise that question once again.

In the face of lowballing rates, unregulated sales, and outright fraud, the real public policy question is which insurers should stay in business and which should close down. Then, instead of looking for rate increase relief from an earmarked side fund such as the proposed DBPR, whatever shortfall results from limits or delays imposed on premium increases would have to be made up out of the insurer's surplus fund, exactly the same as is being done now.

A case can be made for creating special rules for the pricing and reserving of long-term-care insurance, as brought to mind by Mr. Bluhm's reference to the Actuarial Standards Board rule on CCRC fee increases. Long-term-care insurance will have relatively high premiums to begin with, especially if inflation provisions, premium refunds, and paid-up insurance features are included. Future rate increases for this kind of insurance need to be kept within the means of these older insureds, making adequate policy reserves an important aspect of the LTC program. The difference is that these policies are guaranteed renewable, with issue age rating methods. There is a very large policy reserve to support the benefit structure, and this reserve is highly sensitive to investment earnings. Thus, special rules are in order.

To summarize, Mr. Bluhm has brought to our attention a critical public policy question, one that goes beyond the major medical example in his paper. The broader question is, How can health care costs be allocated fairly among the citizens of the Republic? The question is complicated by the fact that almost every group seems able to get some kind of price

break, except for the people who purchase the traditional individual major medical insurance. As Medicare and Medicaid have cut back their levels of reimbursement over the years and more group buyers are negotiating discounts with competing provider groups, the resulting cost-shifting presents the individual health actuary with this ever-worsening problem of maintaining fairness among a rapidly declining number of lives. In the coming years I expect Mr. Bluhm's paper to be useful in any postmortem analysis of what went wrong with the American system of health care financing in the last half of the twentieth century.

END NOTES

1. SHAPLAND, ROBERT B. Discussion of E. PAUL BARNHART, "A New Approach to Premium, Policy, and Claim Reserves for Health Insurance," *TSA* XXXVII (1985): 47–56.
   Mr. Shapland emphasizes the relationship between rating practices and principles and reserve standards. See also his list of factors affecting claim costs, on page 49.
2. KOPPEL, S., O'GRADY, F.T., SEE, G.N., AND SHAPLAND, R.B. "Reserve Principles for Individual Health Insurance," *TSA* XXXVII (1987): 201–34.
3. SCHAEFFER, GAIL P. "Long-Term Care Insurance: What Would That Sort of Thing Cost?" *Health Section News*, No. 13 (May 1988): 26–28; reprinted from *Best's Review*, Life/Health Edition, April 1988.
   Ms. Schaeffer investigates the wide range of gross premiums being used for long-term-care insurance products. She attributes part of the differences in rates to plan design and benefits and part to differences in pricing philosophies. The latter, she says, are dangerous "because they are invisible to the public and to regulators."

ROBERT B. SHAPLAND:

Mr. Bluhm is to be commended for increasing the discussion on coping with durational claim experience, especially because of the impractical results of durational rating of individual major medical business. Here, durational rating usually develops via closing off blocks of business and starting new ones with ongoing prices based on their separate experience.

Regarding this durational experience phenomenon and pricing result, I have the following observations:

1. Much, if not most, of the durational morbidity under calendar-year deductible major medical policies stems from claim-incurred date coding. Here, insurers assign "date of medical service" or "first date of medical service in each calendar year" as the claim-incurred date. Thus, the claim payments for accidents and sicknesses commencing in the first duration are spread over several durations of incurral if treatment continues for several years. Similarly, accidents and sicknesses commencing in the second, third, etc. duration following issue are spread over several subsequent "incurred" durations. Thus, even with no health deterioration by policy duration, the claim dollars showing up as being incurred by policy duration build as they stem from an increasing number of previous accidents and sicknesses. And the effect of these continuing claims on durational loss ratios is compounded by lapsation, since the downstream claim stream stemming from claims commencing in a given duration is related to the reducing downstream premiums from persisting policyholders.
2. There has been no inherent "original insuring promise" to fund for durational morbidity experience. Such a promise would stem only from laws or regulations preempting other valid pricing methods, and those have not been in place. Considering durational morbidity beyond that created by "incurred date coding," durational or tier rating involves matching durational premiums to durational claim experience, and it has been argued that this creates equity between short-term and long-term policyholders. The fact that state insurance departments have historically approved premium rates that are not calculated on a "durational funding" basis belies the existence of some profound underlying principle here.
3. First-duration policyholders expose the insurance company to the risk of their health deterioration in that year and its resultant downstream extra cost as well as downstream claim payments stemming from the use of "dates of service" as the incurred dates for claims commencing in the first duration. Policyholder equity calls for first-year premiums that cover these costs so they are not borne unfairly by other policyholders.
4. Nonlevel durational morbidity costs lead to an affordability problem, because downstream antiselection is created as the remaining healthy insureds move to lower-priced, newly underwritten plans.

The remaining substandard insureds are then faced with commensurate substandard premiums. This is not an equity problem per se but one of paying more upfront to avoid paying more later as compounded by downstream risk differentiation. A similar pricing alternative is present when one chooses between level-issue-age premiums versus attained-age premiums.

5. The value of establishing durational policy reserves is not fully realized without adopting related pricing rules. Otherwise, insurers could still price on a durational basis. I believe that pricing rules should come first and then related reserving rules. I might note in this regard that pricing practices that avoid durational rating might not require durational policy reserves under attained-age-priced major medical insurance if viewed from a "gross premium valuation" standpoint. This would occur if the required higher downstream loss ratios plus downstream administration expenses do not exceed downstream premiums. I also believe that the pricing rules must be mandatory and enforced by law/regulation. Otherwise, competitive pressure will erode their full implementation.
6. Trying to levelize premiums where there are increasing durational morbidity costs presents serious practical problems, since the amount of funding necessary to do so is dependent on the actual realized durational pattern, actual medical care cost increases, and persistency—all of which are unknown at the time of issue. And if any initial underfunding leads to catch-up premiums downstream, this would lead to antiselection by other insurance programs that are lower priced—antiselection that compounds the initial pricing deficiency. There should be an attempt to minimize the impact of these practical problems under any adopted laws/regulations.
7. One solution to durational rating would be the industry-wide pooling of the morbidity experience of substandard risks. Here, insurers could assign anyone to the pool at the beginning of each calendar year. Each insurer would administer its pooled risks and report its pooled experience after the end of each year. Profits/losses would be based on each insurers' premiums and claims and a designated expense allowance, and the industry-wide results would be shared by all insurers.

GERARD SMEDINGHOFF:

The duration-based policy reserves (DBPR) method is presented as a solution to the problem of the pricing and reserving of individual and small-group medical insurance coverages from the perspective of the group actuary. Instead of discussing the feasibility of implementing DBPR, this discussion concentrates on its economic effects on the customer base.

DBPR, like most other health care solutions, is driven by reactions to mandates of legislators and regulators. It attempts to treat the symptoms of an overregulated market while ignoring three basic economic and insurance principles: (1) customer utility and value, (2) the function of underwriting and risk classification, and (3) the time preferences of both parties to a transaction. The results are that some customers benefit at the expense of others and that the aggregate utility derived from the market is reduced, not enhanced.

Customer Utility and Value

The primary basic economic principle that drives any market is that free and open competition, when allowed to prevail, yields the greatest level of product available at the lowest allowable price, resulting in the greatest aggregate economic utility derived by the consuming public. However, when free markets are unnaturally altered (usually by governments), one of two negative outcomes results:

1. A lower-than-optimal price for the product is mandated (for example, gasoline in the U.S. in the 1970s). This results in a *reduction of total product available* and divides consumer demand into two categories of (a) unsatisfied customers whose demands are left unmet and (b) customers who are able to purchase the product, but must pay an extra premium in the form of longer-than-normal queues (increased waiting times).
2. A higher-than-optimal price is mandated (for example, air fares prior to airline deregulation). This results in a *reduction of aggregate demand* and divides consumers into two categories of (a) marginal price-sensitive consumers (that is, elastic demand), who are priced out of the market, and (b) customers who are still able to purchase the product, but whose economic benefit is reduced due to the higher price.

The first case is the consequence of efforts of legislators to limit underwriting and of state insurance regulators to limit rate increases; these

efforts have resulted in a stampede of insurance carriers exiting the market. The second case represents the pricing implications of DBPR, which would require "substantially higher premiums" as acknowledged in the paper's conclusion. These higher premiums will affect three categories of the buying public:

1. Insurable consumers at the margin, who represent elastic demand in the medical insurance market: they will be priced out of the market and left uninsured.
2. Insurable consumers who are not as price-sensitive: they will derive less economic value from their coverage because they must now pay higher-than-normal premiums.
3. Consumers who are insurable at substandard rates: they *may* benefit from continued coverage at lower rates in later policy durations in exchange for higher premiums in earlier durations.

Legislators and regulators are forcing insurers to cater to members of the third category—at the expense of those in the first two. Members of the third category might agree with the paper's conclusion that the "DBPR should be based on a reasonable and responsible public policy position that will produce *socially desirable results*" (italics added). Those in the first two categories would not; their definition of "*socially desirable results*" is entirely different.

This is not the case in most other lines of insurance. For example, auto insurers routinely rerate drivers who are at fault for an accident and cancel coverage on intoxicated drivers. DBPR is only "reasonable and responsible public policy" if the economic interests of members of the first two categories are subordinate to those of the third category. Such a policy may be no more "socially desirable" than the 1938 Treaty of Munich; it depends on one's perspective.

Function of Underwriting and Risk Classification

Legislative and regulatory efforts to limit tiered and durational rating have been accelerated and expanded to such an extent that DBPR abandons them altogether and attempts to define an insurance market without them. Yet tiered and durational rating are traditional insurer responses to the fundamental problems of [re]underwriting and risk [re]classification. In fact, every insurance market must deal with these problems in one of two ways: it either

1. Allows insurers to effectively re-underwrite its policyholders using tiered and durational rating methods, placing the onus to "shop" carriers on the *minority* of policyholders who represent substandard risks, or
2. Prohibits these rating methods and forces select and standard policyholders to continually subsidize the substandard risks, placing the onus to shop carriers on the *majority* of desirable risks.

The first method is more efficient for both (a) consumers, because a relatively small portion of them will shop their policy at each renewal, and (b) insurers, because actuaries can estimate future claims more accurately. The second method forces the majority of policyholders into shopping their business at each renewal—a nonproductive economic waste—and requires that actuaries estimate more of the factors that affect the policy loss ratios.

Insurance schemes in which select and standard risks subsidize substandard risks can function effectively only when (a) the policyholders agree on a time frame at the contract's inception (for example, 10-year term or whole life), (b) the deterioration of the risk is confined within an acceptable and predictable range, and (c) enough good risks are willing to pay premiums in the later durations to fund the losses generated by the poor ones. None of these three conditions holds for individual and small-group medical coverages, as evidenced by the exceptionally high lapse rates and rate increases necessary to pay the claims of the risks remaining at later policy durations.

Auto insurers would face the same problems as health insurers if they were not allowed to reclassify and drop policyholders. This is precisely why auto insurance experience improves with policy duration; insurers are able to apply tiered and durational rating methods. If they were unable to do so, safe drivers would be forced to subsidize poor and reckless drivers with increasing intensity with each policy renewal. The result would be that safe drivers would lapse and switch carriers to the same degree that healthy people switch medical insurers.

Thus, the statement that tiered and durational rating practices have "been perceived by some as a major reason for the uninsured population today" is questionable at best. For other forms of insurance, just the opposite is the case. By definition, every insurance scheme must price some potential customers out of the market. The first scenario, by using [re]underwriting and risk [re]classification, prices some substandard risks

out of the market, while the second scenario, by abandoning these insurance tools, prices some select and standard risks out of the market.

Time Preferences

An economist would collapse this discussion under the general heading of "time preference." For example, an investor who buys a 30-year bond chooses a longer time frame than one who buys 90-day Treasury bills. The same applies to a life insurance applicant who purchases whole life coverage instead of 10-year or annually renewable term. For auto insurance, a 6-month policy period is the nearly universal time frame. For medical insurance, however, the time question remains ambiguous.

Mr. Bluhm uses the fundamental insurance principle of homogeneous risk classes as the foundation for his definition of the medical insurance contract. However, he continues by mandating a universal time frame by basing the contract on "membership in the *original* pool" (italics added) of policyholders who must share "the risk that the health of any member of the group will deteriorate to a state of predictably higher-than-average expected costs . . . resulting [in an] expected subsidy between its members. . . ."

Free markets leave the choice of time preference to the desires of buyers and sellers. DBPR mandates a much longer time frame for medical coverage than most insurers and customers would prefer. Using the investor analogy, this essentially mandates that investors be prohibited from buying 90-day Treasury bills and forced to satisfy their particular investment preferences by purchasing 30-year bonds and selling them 90 days later on the open market as 29¾-year bonds. It denies consumers the option of making a purchase decision based on a shorter time frame.

Policyholders determine their time preferences based on the price they are charged for the option. Insurers price this option by (a) allowing policyholders to choose an explicit time frame (for example, 10-year term), (b) levying surrender charges on early lapsers, (c) designing the policy such that the profits from persisting policyholders offset the losses from those lapsing, or (d) offering premium discounts (auto) or dividends (life) to persisting policyholders. Why should some medical insurance customers be denied this option just because they happen to be affiliated with a small group or no group at all, while large-group customers are still able to purchase medical coverage priced from an effective 12-month time horizon?

Further along in the paper, the time preference question is raised from a public policy perspective from which the author concludes, from the perspective of the DBPR methodology, that the insurer abrogates the insurance principle and its original guarantee. If the insurer and the policyholder agree in advance on a 20-year time frame for the contract, then this statement is correct. But if the time horizon is never stated, then the issue is left unresolved. Or at best, it is simply a matter of perspective whether an insurer and its actuaries are guilty of abrogating the insurance agreement instead of a lapsing policyholder.

In essence, what DBPR effectively does is to apply actuarial and insurance principles to a market that is moving farther away from the insurance concept. It raises the ante on individual and small-group medical insurance buyers by forcing them to extend their time horizons. The next logical step in this process, just like the Social Security system, is to prohibit any of them from withdrawing from the contract—regardless of how much it damages their welfare.

DBPR attempts to temporarily dampen the cries of the critics of the current health care market by skewing and redefining it to what they are assumed to prefer. Actuaries should take note of one of the basic laws of economics: one can define the marketplace, but not the market (for example, the Federal Government has decreed that there shall be no marketplace for hard drugs such as heroin and cocaine). If the question is how to meet society's unlimited demand for health care, then the answer will be in the form of nationalized health care patterned after the rules and penalties of the Social Security system. If the question is how can the insurance industry best meet the public's demand for health insurance, then the focus should shift away from the whims of legislators and regulators and towards the basic principles that operate in other insurance markets. The message that individual and small-group policyholders send to the medical insurance market, by regularly switching carriers, is just as valid and should not be ignored.

(AUTHOR'S REVIEW OF DISCUSSIONS)

WILLIAM F. BLUHM:

I thank each of the six discussants for their thoughts on what I believe to be an important topic.

Mr. Barnhart's comments are encouraging and greatly appreciated.

Mr. Evans offers an argument based on his observations about certain coverages. I agree wholeheartedly with him, and refinements should certainly be considered. It is important in doing so, however, that a balance always be struck between theoretical precision and simplicity.

Mr. Fuhrer offers some interesting modifications. The first could probably be implemented fairly easily, but would tend to have a negative impact on company earnings at a particularly risky time—when claims have been unexpectedly high. This would seem to leverage the impact of misestimating claims on surplus.

Mr. Fuhrer correctly points out that the method may overstate the effects of excess lapsation. For various reasons, I thought that the chosen method was the best compromise between theoretical rigor and calculational simplicity. A minor amount of margin is appropriate for reserves.

Mr. Habeck has been a friend for a number of years, but I still disagree with most of his assumptions and conclusions. The insureds will *not* see higher premiums from the DBPR method over the life of the policies. This is really quite clear if we return to basic principles. If future claims are a fixed amount and if net premiums are chosen to fund those claims over the life of the policies, how can net premiums be other than equal to claims, provided gross premiums are a simple multiple of net premiums?

The true difference between current methods and DBPR is how the higher claims that occur later in the life of the block of policies are *allocated between policy durations*. On average, over the life of all policies, either policyholders will pay the same amount or the company's profit will be affected. Under DBPR, premiums are higher *initially*, but with lower increases later, avoiding the negative tontine of an assessment spiral.

Regarding Mr. Habeck's discussion of the DBPR public policy issue, which he calls my "justification," I do not believe any defense should be necessary. The first paragraph in the section clearly states the hypothesis. That hypothesis seems reasonable to me and to many others (including most public health policy people with whom I have talked). Others, like Mr. Habeck, do not agree. Readers will have to make their own choice. Personally, however, I find it *immoral* to knowingly entice unknowing insureds into a risk pool in which, should they become uninsurable, they will inevitably be trapped in an antiselection spiral that was knowingly built into the premium structure by their insurer.

Mr. Habeck surprises me by refusing to admit that durationally anti-selective lapsation (CAST) exists. While DBPR would probably be useful only for policies with durationally increasing claim costs, there is little doubt that it exists. I would refer him to the discussions (other than his own) of my earlier CAST paper,* as well as the Society's recent small-group research study.†

Mr. Habeck has confused the public policy underpinnings of DBPR with the actuarial assumptions. If you accept the underlying premise, the rest follows. He seems to have some problem with the calculations, which was not the situation for other readers. Net level reserves were used in the example because that was the example I chose. Many others are possible. (To use attained age rates with zero reserves, however, would yield boring graphs, with the current basis being a flat line at zero.)

Mr. Habeck's comments contain misinterpretations and errors. For example, he says "(an) assumption is made that it will be the healthy lives that will tend to lapse and thus 'unfairly' drop out of the original pool of risks." On the contrary, I believe the only "unfair" aspect of this situation is if the insurer allows the healthier risks to lapse without having contributed their fair share to the deterioration of the health of the pool in which they participated. The reason a policyholder leaves the pool is a largely irrelevant point, as is the comparison with community rating.

Mr. Habeck asks, "To what extent (does) the author envision policy reserve factors stated as a percentage of gross premiums?" The paper says, "This adjustment converts the reserve factors into 'per $1 of premium' factors. . . ."

Column (18) is needed to produce the results described in Figures 3 and 4, as described in the text.

Can the reserve contribution be greater than the claim cost in the first two durations? Of course. Why is this surprising? It simply illustrates the magnitude of the reserves that *should* be held and currently are not—emphasizing my point rather than refuting it.

Mr. Habeck does raise an important point that I have not tried to address: What sort of reserve modification might be appropriate to offset nonlevel acquisition expenses? That is a large subject, better kept for another day.

*BLUHM, WILLIAM F. "Cumulative Antiselection Theory," *TSA* XXXIV (1982): 215–46.

†BRINK, STEPHEN D., MODAFF, JAMES C., AND SHERMAN, STEVEN J. "Variation by Duration in Small-Group Medical Insurance Claims," *TSA 1991-92 Reports* (1993): 333–80.

I do not understand Mr. Habeck calling actuarial assumptions for DBPR "subjective," while inferring assumptions used in other methods are not subjective.

His question on the "financial implications" of this approach is also confusing. Column (21) of Table A-1 shows the aggregate DBPR reserve corresponding to one policy. To find the aggregate reserve for a block of policies, simply multiply column (21) by the number of policies issued. This is the impact on the liability page. Then subtract each year from the prior year to find the impact on the income statement.

Mr. Habeck appears to contradict himself. On the one hand, he implies rating and reserving methods should be consistent; he then implies no reserves are necessary if the "experienced actuary make(s) allowances for (rate approval delays) in the rate-setting process."

His comment on the regulatory fear that reserves would release in the face of wholesale cancellations is a valid one. It needs to be addressed in implementing any regulations or statutes, but need not be an argument to avoid holding appropriate reserves.

Mr. Shapland, another long-time friend with whom I occasionally indulge in actuarial fencing, has brought out a good point in his item 1. To the extent "per-cause" policies attribute long-term and chronic illnesses to an incurral date coincident with when the insured became uninsurable, the durational effects I have described are reduced. However, no such policy I have ever seen has an unlimited benefit period and a dating rule that is 100 percent effective at allocating all costs back to the date a person would first become a higher risk due to impaired health. These would be necessary to fully prefund the health deterioration comparably to DBPR. Also, the impact of trends on claim costs is difficult to handle in such situations. Nevertheless, mandatory per-cause incurral coding could be a partial solution to the public policy problem. Is Mr. Shapland proposing this?

I respond to the rest of Mr. Shapland's points by number, avoiding those that need no comment:

2. Since Mr. Shapland gives his personal opinion on the public policy hypothesis I posed, I do the same. I strongly disagree with his reasoning. The promise I speak of stems not from laws and regulations, but from our own sense of ethics and fairness. Readers should make their own decision. It is not an actuarial one; it is a personal, ethical one.

3. This flows from item 2, and again, I disagree. However, it is consistent with his underlying premise of "caveat emptor."
5. I disagree. If insurers choose to fund the reserves from surplus by charging early lower rates, why shouldn't they be permitted to do so (in the absence of antitrust concerns, of course)?
6. Mr. Shapland is correct about the difficulty in accurately choosing assumptions. I would maintain, however, that even badly chosen assumptions are likely to be far more accurate than zero reserves and no assumptions at all!
7. This seems a reasonable alternative. It does require significant regulation, however. Experience with such a pool in Minnesota has demonstrated the susceptibility of such funds to damaging political expediency and is a significant problem.

Mr. Smedinghoff misses an important point. Most insureds are not sophisticated enough to understand the impact to themselves of durationally increasing versus durationally level policies. This lack of understanding is one of the valid reasons, in my opinion, for regulation. In essence, durationally increasing premium structures force the insured into a bet they are not aware that they are making: If you get chronically sick, you will be stuck with vastly increasing premiums due to an antiselection spiral. If you don't, you can change carriers and keep your premiums down.

He leaves out one category of insureds: uninsurables—those who cannot find other coverage even at higher rates.

Mr. Smedinghoff says "a relatively small portion of (consumers) will shop their policy. . . ." This is generally wrong. Many individual insurers have observed lapse rates of up to 50 percent in the first year and high rates thereafter.

I object to the analogy that policyholders who have gotten sick are comparable to "poor and reckless drivers" in auto insurance. This seems to imply it is entirely appropriate to charge health insureds based on their changed risk profile over time, such as by getting a disease. Again, this is just a camouflaged statement of opinion that "there is no insuring promise" to maintain the integrity of the health pool. I disagree.

If there were a way to ensure people understood the risk that they take with durational rating (which there is not, in my opinion), I would agree that the public need is being met.

There used to be quite a few companies that tried to market durationally level policies. Most are now out of this market. They could not find a way to explain the concepts to their customers, they refused to durationally rate, and they could not otherwise compete.

My thanks to all the discussants for their thoughtful comments.