SOCIETY OF ACTUARIES

Article from:

The Actuary

November 1981 – Volume 15, No. 9

ECONOMIC CYCLES AND THE HEALTH INSURANCE BUSINESS

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Ed. Note: This is one of a series written at the invitation of the Society's Committee on Continuing Education.

Actuaries engaged in pricing and financial forecasting for the health insurance business have begun to pay attention to the effects of economic cycles. Until recently, most such arithmetic took refuge in one of three assumptions:

(1) Things will not change;
(2) Things will change in the same way they changed last year; or
(3) Things will change by more (less) than last year to the same extent that last year's change was more (less) than the year before.

Of course, actuaries knew that none of these assumptions was correct, and that all that can definitely be said about a forecast is that it will be wrong.

Meanwhile, economists studying the behaviors of macro-economic indicators such as changes, in real gross national product, in the CPI, in the GNP price deflator, and in the unemployment rate, have clearly shown the significance and dimensions of economic cycles.

A project in which I recently participated as a consultant explored the relationship of health insurance experience to such economic indicators, revealing the relationships shown at end of this article.

Our justifications for assuming these relationships varied. Enrollments within group plans clearly will decrease as unemployment rises, while the number of plans in force may depend more upon the sizes of rate increases compared to the general rate of inflation. That is, if a company chooses to increase its margins, its rate increases will tend to exceed those of its competitors, and cases will leave. Exposures under individual policies tend to increase from conversions when unemployment rises, but to decrease from direct sales as people become less able to pay their premiums.

Many companies can demonstrate that use of health care services, specially hospitalization, increases during recessions, but I am not aware of any published documentation. The relationship between the cost of such services, particularly the medical care component, to the CPI is more easily identified.

The relationships involving cash flow are intuitive. If the economy, measured by change in real GNP, is weak, premiums may be expected to be paid more slowly, and claims filed more promptly. Increases in the real cost of money (excess of the prime rate over the inflation rate) will have similar effects.

We actuaries should embark upon more research into these relationships.

Experience Factor	*Economic Indicator*
Exposure (enrollment)	Unemployment Rate Relationship of Rate Increases to Change in CPI
Utilization (frequency)	Unemployment Rate
Cost per Claim	Change in CPI
Cash Flow	Change in Real GNP Relationship of Prime Rate to Change in CPI

Letters

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Pricing and Surplus

Sir:

In a paper published in *TSA XXXI* (1979), Robin B. Leckie developed a theory of surplus management which recognized growth as a parameter in determining the annual charges to policyholders for surplus maintenance.

For a company with liabilities (L_t) growing at rate g_1, the paper defines this annual charge, e_1, as a percentage of liabilities. Using the notation in the gross premium Study Note, which uses the symbol ${}_sB_x$ to represent Anderson's book profits per $1,000 in force at the beginning of year S, it can be shown that if Leckie's surplus charge in year S from time t,

$$e_1 \; L_t \; (1+g_1)^{S-1},$$

is equal to Anderson's book profits at the end of year S,

$$\sum_x \; {}_sB_x \; \ell_{[x]+S-1} \; (1+i),$$

then Leckie's formula for surplus at time n becomes

$$(1+i)^n \sum_{S=1}^{n} \sum_x \; {}_sB_x \; \ell_{[x]+S-1} \; (1+i)^{1-S} \qquad (1)$$

which is the accumulation of Anderson's book profits to time n with the net earnings rate i on surplus equal to the interest rate j at which book profits are discounted.

This suggests at least a desired pattern for emergence of book profits in new product development. Unfortunately, profits before dividends do not, in general, follow a pattern which allows direct application of these principles. As an alternative it may be helpful to examine the following formulation which represents the accumulations of surplus from a number of years of issue at an assumed rate of growth g in new business

$$\sum_{n=1}^{N} (1+g)^{N-n} \times (1). \qquad (2)$$

Formula (2) can then be compared to

$$\sum_{n=1}^{N} (1+g)^{N-n} \sum_x \; {}_nV_x \; \ell_{[x]+n}$$

to see if an acceptable reationship between surplus and reserves is produced. If at time N both (1) and (2) are equal to the desired surplus objective then the charges suggested in Leckie's paper can be used thereafter to maintain surplus at the desired level.

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