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Controversies Surrounding Zillmer Reserves

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August Zillmer first proposed the Zillmer variation of preliminary term reserves in 1863. For almost forty years, Zillmer reserves were the center of controversy and debate in Prussia and Imperial Germany. Different approaches were taken to preliminary term reserves in the various provinces of Germany, and Prussia was on the verge of repealing its authorization of Zillmer reserves when a new imperial law governing private insurance went into effect on 12 May 1901. Regulatory authorities interpreted paragraph 11 of this law as authorizing Zillmer reserves.

Recounting some of argumentation used in the Zillmer reserve controversy provides information useful to actuaries involved in public policy formulation today in that

1) matters relating to insurance regulation frequently put actuarial experts at the center of political debates similar to the Zillmer reserve controversy in their technical

complexity and acrimony, and

2) the Zillmer reserve controversy itself has been raised by the IRS in disallowing as life insurance reserves the Zillmer reserves required on health insurance policies issued in Japan.

A popular adage says that there are two things one should never see being made: sausages and laws. Valuation laws are no exception to this rule. The lessons we have learned from the advocates and opponents of Zillmering are practical, but not always edifying.

The Argument and the Audience

<u>In advocating one's proposal, it is important to seize the moral high ground</u>. In the first paragraph of <u>Contributions</u>, Zillmer casts himself in the role of the protector of widows and orphans and one dedicated to guaranteeing the solvency of insurance companies. He does so by quoting the remarks of the New York Commissioner of Insurance on the occasion of his withdrawal of the license of the American Mutual Life Insurance Company of New Haven, Connecticut to do business in New York.

<u>The legislative or regulatory body needs to think that the future of the industry is being held hostage by this question</u>. Zillmer quoted some of the more intemperate remarks of those opposed to

high first-year commissions and raised the question of what would happen if the public lost faith in the life insurance industry.

The desired resolution is no more than what is fair. Fairness for Zillmer is that each class or cohort of business pays for itself. Obviously individuals do not pay their own claim costs. Under Zillmer's proposal some policies, those with young issue ages which lapse early, would not pay their own closing costs. Zillmer has misgivings about this and argues strongly for limits on closing costs to preserve equity (and solvency).

Give the legislators or regulators a litmus test with which to test proposals. Zillmer proposed the following litmus test for modified reserve systems: 1) the reserve should be based on net premiums rather than gross premiums, making the determination of the amount of the reserve objective, and 2) the reserve in conjunction with future net premiums should be demonstrably adequate to fund the obligations of the company.

The higher reserve is not necessarily the better reserve. Nor does the higher reserve necessarily represent a more conservative approach. Rather one must test the ability of the reserves together with the premiums to meet the assumed incidence of mortality and administrative expense. Zillmer pointed out that because the mortality table in use before the Combined Experience Table had higher mortality rates at midlife than the Combined, it resulted in lower reserves at those ages but higher premiums. The Combined Experience Table reserves were preferred, not because they were higher, but because Combined Experience premiums and reserves were a better reflection of the anticipated expense pattern.

<u>The proposed policy is consistent with past practice and represents a minimal adaptation to new realities</u>. Asymptotically, Zillmer reserves approach conventional net level premium reserves. For new, rapidly growing companies, the difference between Zillmer reserves and conventional net level premium reserves provides needed surplus relief; however, for the established companies like the Insurance Bank of Gotha, the differences between Zillmer reserves and net level premium reserves are minimal. This argument allows the change in the valuation law to be supported by some conservatives.

<u>Legislators and regulators need to have options, but not an unmanageable number of them</u>. By insisting that he had proved that any acceptable reserving system was algebraically equivalent to Zillmering, August Zillmer limited the number of options to be considered. However, Zillmer simply put an upper bound on closing costs and left it to the authorities to determine an appropriate limit for closing costs.

Zillmer focused on the income statement implications of his proposals more than the balance sheet. The liability side of the life insurance balance sheet is somewhat arcane. Concepts of income are more intuitive. By focusing primarily on the effect of Zillmering on the income statement, Zillmer was able to get more legislators and regulators to understand the public policy issues involved. Zillmer's decision to focus on the income statement is quite interesting in that in the United States, the income statement did not become the pre-eminent accounting statement until well into the twentieth century.

Public policy in the area of life insurance must be evaluated in terms of its immediate, intermediate, and long term effects. In his model office projections, Zillmer produced annual figures for 60 years. Since the policy used in his model office was a life insurance endowment at 90 and the youngest issue age assumed was 30, this allowed his model to reach steady state. Measuring the long term effects was particularly critical since one of the major arguments against high, first-year commissions and Zillmering was that these practices amounted to borrowing from existing policyholders to finance the acquisition of new policies. The sustainability of the first-year commission system and Zillmering called this "borrowing" analogy into question.

Legislators and regulators sometimes respond to different issues than the industry. Large first year commissions fueled a dramatic expansion of the life insurance business. This growth in the life insurance business was good for the society and the economy. Life insurance provided some safety net for both male and female workers in the newly industrializing German economy. Life insurance provided a vehicle for savings and capital formation. Holding on to net level premium reserves would make some new insurance companies insolvent and lead to slower growth in the established companies. Zillmer raised the specter of insolvencies and slow growth in the first two paragraphs of his monograph.

The fewer formulas the better. August Zillmer introduced Zillmer reserves in a 39 page monograph entitled Contributions to the Theory of Life Insurance Reserves (Stettin, 1863). Zillmer presented his response to the problem of closing costs (first year commissions) without expressing a single formula algebraically. He gives prose formulas for the modified premiums. Most of the numerical illustrations are integrated into the text; there are only 7 pages of numerical exhibits at the end of his paper. Very few of those who actually will make the actual choice have the time, inclination, or ability to follow a mathematical argument.

It is not clear to that the scientific paradigm was/is used to make decisions about complex technologies like Zillmer reserves. Zillmer published the parameters of his model in sufficient detail to allow his results to be replicated by any actuary with sufficient computational resources. In 1863, few actuaries enjoyed the institutional support Zillmer had, and few could have replicated his results. Within the last few years, sufficient computational resources have become available to the individual actuary to replicate Zillmer's results. Using Quattro Pro on an AT clone, I replicated virtually all of Zillmer's calculations and reproduced all of his tables (except for the last two columns of the table on page 18). However, I may have been the first actuary with the resources and the inclination to replicate his results. So much for the scientific method.

Proof by "general reasoning" is useful in public policy debate. Proof by general reasoning is the practice of generating a formula term by term from a narrative. An example of general reasoning from Jordan's Life Contingencies (1968) follows:

$$A_x = 1 - d\ddot{a}_x$$

> This equation can be interpreted as follows: A_x is the present value of a payment of 1 at the end of the year of death of (x). If this payment were made now, its value would be 1; but since the payment is deferred, we must deduct the value of the interest which it earns between now and the end of the year of death. The value at the beginning of the year of interest on 1 is d, and the present value of the interest for each year that (x) enters upon is $d\ddot{a}_x$. Hence, $A_x = 1 - d\ddot{a}_x$.

Such proofs have long been a staple of the Society of Actuaries exam syllabus. General reasoning proofs were also a staple of the German debate on reserve formulas. While the appeal of "general reasoning" is not universal, proofs by general reasoning communicate to a significantly wider audience than algebraic proofs.

What the regulators think the law says is at least as important as what the law says. The anti-Zillmering forces thought they had won the day when the imperial insurance law of 1901 provided no explicit authorization of Zillmering. The individual who drafted paragraph 11 of the law, Mr. von Knebel Doeberitz, indicated that he and the drafting committee thought that the law did not authorize Zillmering. No matter. The regulators and the pro-Zillmering forces agreed ahead of time that this law would be interpreted as allowing Zillmering as long as the closing costs to be amortized in the reserve formula were no more than 1.25 percent of the face amount.

The relevance of this anecdote today is illustrated by the recent (13 July 1990) passage of the Americans with Disabilities Act in the United States. The act was amended at the last minute to allow food industry employers to reassign workers with diseases that could be spread through contact with food. Those proposing the amendment thought the wording meant that AIDS-infected workers would be prohibited from handling food. However, the act authorizes the Department of Health and Human Services to determine which diseases can be passed along through contact with food. After the bill was passed HHS Secretary Louis W. Sullivan said that no evidence exists that AIDS is spread that way.

Ad hominem Arguments

<u>Reprobates, particularly foreign reprobates, can be useful as bad examples.</u> Zillmer uses the English insurance companies of his day as examples of fiscal irresponsibility. The German mind cannot even conceive of anything so foolish as the English practice of gross premium reserves. The English were pilloried as being even more foolish than the unfunded, fraternal assessment life insurance plans. At least the member of the fraternal organization had not committed adequate funds to the plan whereas the English insured had paid adequate premiums but had nothing to show for it when the company went broke because of its reserving practices.

<u>Ad hominem arguments are easier to understand than logical arguments.</u> Those who favored gross premium reserves were thinking just as the English thought - an obvious oxymoron. If an argument has some face validity, its author can be accused of plagiarism. Defending himself from the accusation of plagiarism will render him ineffectual and non-credible in future debates.

Insurance industry actuaries and executives are particularly vulnerable to ad hominem arguments. Industry executives and actuaries participate in the debate because the economic interest of their employers is at stake. Once the economic interest of the employer is made clear, the industry actuary or executive frequently loses credibility.

Even though academic research on insurance topics is frequently funded by the insurance industry, academicians do not seem as vulnerable to the "conflict of interest" argument. The publication record or lack of it is critical for the credibility of an academic participating in public policy debates. The publications themselves and the critical evaluation of those publications make it possible to impugn the academician. The microscopic review of Judge Bork's publications when he was nominated to the United States Supreme Court provide a good illustration of the technique.

Opponents are guilty of gross over-simplification. Most arguments, especially those that are model-based, make some simplifying assumptions in order to draw their conclusions. August Zillmer used this line of attack when dealing with a discussion of life insurance reserves written by an attorney, Adolph Rüdiger. Mr. Rüdiger was arguing for nonforfeiture provisions.

Opponents are not qualified to even have an opinion on this issue. Since Mr. Rüdiger was a lawyer expressing an opinion on what was obviously an actuarial issue, his views could be trivialized. In some settings, this type of argument works; the issues are perceived as the proper bailiwick of professionals and experts. Other issues are perceived as too important to be left to the experts. For example, the nature of the person of Christ was too important to be left to the clergy so the Emperor Constantine, not even a Christian at the time, determined the wording of the Nicene Creed. The clergy were then left with the problem of interpreting what the emperor meant.

Zillmer's sharp tongue may have made him the wrong person to be the advocate for preliminary term reserves. Zillmer was unquestionably the pre-eminent, German-speaking actuary of his time. He had earned a Ph.D. in actuarial science. His successful actuarial mathematics text was the successor to the classic text by Tettens, which had been used for 100 years; he founded the professional organization for German actuaries; he conducted the first multi-company mortality study on the continent; he had an excellent publication record; as an insurance executive, he had a reputation for honesty and competence. For preliminary term reserves to be accepted, Zillmer had to be in favor of them, and perhaps he had to be the one to propose the initial formulation.

Unfortunately, Zillmer like many academicians interpreted attacks on his work as attacks on his person, and his responses could be quite intemperate. On one occasion he impugned the scholarship of a new ph.d. economist, terming his research "not very promising." On another occasion he implied that an actuary opposed to preliminary term reserving was just a lackey for the large established life insurance companies. The quality of public debate on Zillmering degenerated to such an extent that at least on one occasion a prominent actuary wrote on Zillmering under the pseudonym Logophilus to avoid being exposed to the rough and tumble of the public debate.

Conclusions

Generally, the arguments for Zillmer reserves were reasoned and showed considerable sensitivity to the perspective of legislators and regulators. Both sides in the Zillmer reserve controversy used ad hominem arguments. Ad hominem arguments seemed to contribute little to the understanding of the issues, made the debate considerably more rancorous, and discouraged qualified individuals from participating in the discussion.

The ultimate resolution of the Zillmer reserve debate apparently took place, not in the public forum but in the proverbial smoke-filled room. The pro-Zillmering faction was able to snatch victory from the jaws of defeat. The major lesson to be learned from the Zillmer reserve controversy in Imperial Germany can be summed up in the words of Yogi Berra: "It ain't over 'til it's over."