



American Finance Association

Plasm: Pension Liability and Asset Simulation Model: Discussion

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Source: *The Journal of Finance*, Vol. 37, No. 2, Papers and Proceedings of the Fortieth Annual Meeting of the American Finance Association, Washington, D.C., December 28-30, 1981 (May, 1982), pp. 604-606

Published by: Blackwell Publishing for the American Finance Association

Stable URL: <http://www.jstor.org/stable/2327368>

Accessed: 27/11/2009 08:17

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used to project if and when the legal limitation might be exceeded. Management will then be in a position to encourage increased sales or to accept blocks of reinsurance which will result in increased reserves and increased premium income. This raises the limitation on the policyholders' share, and again defers taxes.

3. SUMMARY

During the course of its lifetime SOFASIM has been used in simple projects such as testing the effects of changes in premium scales, commission scales and/or reserve bases on taxes and surplus; testing different combinations of permanent and term plans of insurance considering variations in the investment market place; and testing the pattern of GAAP earnings by policy year of various plans of insurance. It has also been used in more complex projects such as studying retention limits using SOFASIM's stochastic facilities, testing profitability of various products with different expense allocations, and investigating the relationship in an inflationary environment between excess investment income and increasing costs for term and permanent insurance.

These are just a few of the model's possible uses. With "creative lying" and perhaps some actual programming changes, many more questions can now be asked and answered.

SOFASIM is currently available to any member of the Society of Actuaries through the time sharing facilities of National CSS. An insurance company with a large enough in-house computer and a SIMSCRIPT II.5 compiler could install SOFASIM, as could any of the more than 200 universities which already have SIMSCRIPT II.5 compilers.

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DISCUSSION

W. F. SHARPE*: Simulation seems to beget acronyms. The papers describe SOFASIM, FENSIM and PLASM. I have no product to describe, but in the spirit of the session, my comments may be characterized as ANTI-SIM.

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Each of the models deals with a complex set of interactions covering a long period of time (up to twenty years). The authors argue that the phenomena being investigated virtually defy closed-form solutions. Hence the resort to simulation.

There is no question about the efficacy of these approaches for long-range planning. Each has met the test of the market. However, it appears that the financial content of each could be improved considerably. Given the title of the session and the sponsorship, it seems appropriate to focus on this aspect.

The usual approach to a problem identifies one or more decision variables, an objective function to be maximized or minimized, any constraints, and relevant interactions. In the process, parsimony is a virtue. The goal is an abstraction of reality, with major aspects included and minor ones excluded.

Finance focuses on the role of markets. One can often greatly simplify a problem by substituting the goal of value maximization for the more complex ultimate objective of maximizing utility. Indeed, recognition of market opportunities and the associated ability to separate investment and consumption decisions is a key contribution of Finance to managerial decision-making.

None of the papers provides a clear statement of the objectives of the decision-makers involved. One may presume that the owners of the insurance company are concerned with dividends paid over the next twenty or so years and the residual value of the firm at the end of the period. One may also presume that the owners of the stock of the corporate pension sponsor are concerned with the contributions to the plan over the next twenty or so years and the unfunded liability at the end of that period. Note, however, that while the models deal with dividends and contributions that are cash flows, the residual values are accounting and/or actuarial values—amounts likely to differ significantly from true economic values.

How does one describe a 21-dimensional probability distribution? The exhibits give only some of the relevant information. What about serial correlation? To what extent are outcomes correlated with other variables of interest to the relevant parties (e.g. the values of other stocks and bonds)?

The authors of two of the papers attempt to summarize all this information with a present value. In SOFASIM one can choose 6, 9 or 12% as an interest rate. In PENSIM, some rate of interest is used to obtain the “ultimate cost”. The irrelevance of this approach was shown some years ago in the capital budgeting literature. Only in a world of certainty where one can borrow and lend at a fixed rate of interest does this make sense. In a world of uncertainty, state-contingent claim prices could be used, but none of the papers considers such an approach. Nor is any sort of multi-period extension of a mean-variance analysis discussed.

Presumably one must deal with these issues in a multi-period context because transactions costs make myopic single-period approaches inefficient. Yet the authors consider policies involving substantial transactions costs (e.g. maintaining a given mix of assets by value) and in some cases do not even model the costs associated with revisions.

An interesting alternative would focus on economic values and finesse the issues associated with revision costs. None of the decisions considered here is made once and for all for the next twenty years. Perhaps the appropriate period is the decision interval (e.g. 1 year) instead of the apparent “horizon” (e.g. 20 years). Perhaps one might better ask what the economic value of a company or

a fund will be a year hence than worry about the accounting or actuarial values over the next twenty years if decisions never change. Such a view could facilitate the consideration of many more alternatives; in fact, an analytic model with formal optimization would be feasible. The question is not one of abstraction versus detail but, rather, that of the best choice among alternative abstractions.

One other issue deserves comment. Each paper contains information about the manner in which security returns are modelled. The PLASM approach is by far the most interesting. Indeed, the statements about asset returns made in the Winklevoss paper (based on work by Barr Rosenberg and Associates) are of major importance for many issues in finance, if they are correct. But all are made as assertions; no supporting evidence is given and there is not a single reference in the paper. While the competitive marketplace for proprietary products demands somewhat different standards for documentation than those appropriate for academic research, it seems unreasonable to expect us to accept these assertions until we have been given an opportunity to examine their bases. One hopes that papers providing at least some details of this important research will be forthcoming.

One also hopes that there will be many more sessions of this type. Academics have much to learn from consulting organizations, and this alone justifies such occasions. I have tried to show that consultants can also learn from academics. Yet another example of gains through trade.

DISCUSSION

IRWIN TEPPER*: The 70's brought with it a desire by major corporations to increase their understanding of their pension systems. The models described in the Wilshire and Winklevoss papers arose to meet the need to analyze pension decisions when little expertise had been developed by sponsors in-house. They integrate complex actuarial and investment phenomena to assist in both forecasting and policy analysis. The asset allocation decision was the initial motivation for their development, and the remainder of my remarks will be confined to this use of the models.

By linking the financial requirements of the pension plan with the outlook for inflation and security markets, the models show the sponsor how asset mix affects the plan's funding progress and its cost over a wide variety of economic scenarios. They also show how the picture changes over different time horizons. The models assume the risk/reward tradeoffs that most of us believe exist and that are supported by historical data. The formation of the assumptions about the economy and the security markets is often a controversial exercise, but there is even a more fundamental problem with the simulation approach to pension fund asset allocation.

Despite the sophistication of the models, they have not lived up to the expectations of sponsors as a decision-making tool. Rarely does the model produce an answer. More likely, the data shows that the sponsor can choose from a wide range of alternatives and the choice depends on the preference for risk. For many

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