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Discussion of David Knox's "A Critique of Defined Contribution Plans Using a Simulation Approach"

Michael Sze*

Professor David Knox is to be congratulated for this timely paper, which discusses a topic of major social and economic importance in many countries. Although the author's principal interest is Australia, the general trend of conversion from defined benefit plans to defined contribution plans has been the topic of many research projects in the United States and in Canada. Depending upon the emphasis of the research performed, different surveys have arrived at different conclusions. Participation in both types of plans has been relatively stable after 1984 according to *Trends in Pensions 1992* (published by the U.S. Department of Labor, Pension and Welfare Benefit Administration 1992).

The stochastic approach toward analyzing the benefits provided by defined contribution plans is useful. Additional research may be done, however, to extend the methodology to include simulating inflation, salary increases, and each asset class separately. Statistics in the U.S. indicate that inflation is correlated negatively with many asset classes, and the impact of inflation of on different assets classes are different (cf. Sze, 1993, p. 43).

Another area worthy of further research is the impact of changing investment policy during the active career of the employee. A concept that has received wide acceptance in the U.S.A. is *life cycle investment*. The underlying principle of life cycle investment is straight forward. It promotes the discipline of matching the time horizon of investments to that of the retirement needs of the employee. Let us use the three most common asset classes—stocks, bonds, and cash—to illustrate the principle. Of these asset classes, statistics show that stocks have the highest expected return and the highest volatility. Cash is the most stable and has the lowest

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expected return. The behavior of bonds lies between stocks and cash. For a young employee, the period to retirement is long. Thus, the investment portfolio should include more stocks. As the employee ages, retirement needs become more imminent and risk tolerance decreases. There should be a gradual shift toward fixed income investments. It would be instructive to examine the advantage of such an adaptable investment policy.

The paper mentions the risk of changing annuity purchase rate on conversion of the defined contribution balance to a stream of defined benefits upon retirement. Such a risk is genuine. One way that one may reduce such a conversion risk is to match the duration of assets to the duration of the expected benefit payment stream. Most insurance companies are heavily invested in fixed income assets. Thus, annuity purchase rates typically reflect the investment atmosphere of fixed income assets. If a life cycle investment policy is adopted, most of the investment in years preceding retirement should be in fixed income investments. Matching asset and benefit cash flow is not a difficult process. If such an exercise is performed and continually updated, the annuity purchase risk is reduced greatly. An area for further defined contribution research is to assess the impact of asset/benefit matching before retirement.

References

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Author's Reply to Discussion

Michael Sze has raised a number of issues worthy of further research: in particular, the effect of a more sophisticated inflation and/or investment model, changing investment policy during the life cycle and the possible matching of assets to pension liabilities to reduce the annuity rate risk.

I agree that each of these areas is suitable for further work. It must be realized, however, that as one becomes more particular with respect to life cycle decisions or investment models or policy, the results can be applied only to a proportion of pension fund members. Of course, this does not reduce the value of such research, but it does make the work more specific.

The purpose of this paper is to quantify, at least to some extent, the risks borne by members in defined contribution arrangements. Actuaries always have been aware of the different risk-takers in defined benefit and defined contribution plans. Many plan members and industry commentators, however, have no idea of the possible implications of belonging to defined contribution plans over the longer term. The results in this paper represent one way of illustrating these inherent risks to nonactuaries.

