

Immunization Bounds, Time Value and Non-Parallel Yield Curve Shifts

by Geoffrey Poitras

ABSTRACT

Since Redington (1952) it has been recognized that classical immunization theory fails when shifts in the term structure are not parallel. Using partial durations and convexities to specify immunization bounds for non-parallel shifts in yield curves, Reitano (1991a,b) extended classical immunization theory to admit non-parallel yield curve shifts, demonstrating that these bounds can be effectively manipulated by adequate selection of the securities being used to immunize the portfolio. By exploiting properties of the multivariate Taylor series expansion of the fund surplus value function, this paper extends this analysis to include time values, permitting a connection to results on the time value-convexity tradeoff. Measures of partial duration, partial convexity and time value are used to investigate the generality of the duration puzzle identified by Bierwag *et al.* (1993) and Soto (2001).

Keywords: Yield curve, immunization theory, duration, convexity.

RÉSUMÉ

Nous savons depuis Redington (1952) que la théorie classique d'immunisation ne fonctionne pas lorsque les mouvements dans la structure par termes des taux d'intérêt ne sont pas parallèles. En utilisant des mesures de durée et de convexité partielles pour identifier les bornes d'immunisation pour des mouvements non-parallèles, Reitano

The author:

Geoffrey Poitras, Faculty of Business Administration, Simon Fraser University, Burnaby, B.C., CANADA V5A 1S6, « poitras@sfu.ca ».

This paper benefited considerably from the insightful comments of two anonymous referees and the support and encouragement of the Editor. This paper was partially written while the author was a visiting Professor in the Faculty of Commerce and Accountancy, Thammasat University, Bangkok, Thailand. Support from the Social Science and Humanities Research Council of Canada is gratefully acknowledged.