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Does Macaulay Duration Provide The Most Cost-Effective Immunization Method – A Theoretical Approach

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Abstract

In the following, we offer a theoretical approach that attempts to explain (Comments 1-3) why and when the Macaulay duration concept happens to be a good approximation of a bond's price sensitivity. We are

concerned with the basic immunization problem with a single liability to be discharged at a future time q. Our idea is to divide the class K of all shifts a(t) of a term structure of interest rates s(t) into many classes and then to find a sufficient and necessary condition a given bond portfolio, dependent on a class of shifts, must satisfy to secure immunization at time q against all shifts a(t) from that class. For this purpose, we introduce the notions of dedicated duration and dedicated convexity. For each class of shifts, we show how to choose from a bond market under consideration a portfolio with maximal dedicated convexity among all immunizing portfolios. We demonstrate that the portfolio yields the maximal unanticipated rate of return and appears to be uniquely determined as a barbell strategy (portfolio) built up with 2 zero-coupon bearing bonds with maximal and respective minimal dedicated durations. Finally, an open problem addressed to researchers performing empirical studies is formulated.
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