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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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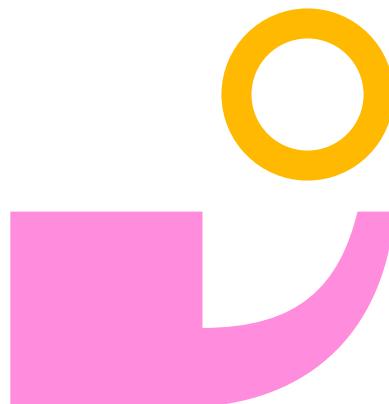
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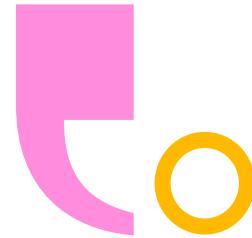
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