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A Hybrid Spline-Based Parametric Model for the Yield Curve*

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Abstract

Empirical evidence indicates that both nominal and real yield curves in important markets have segmentation between their short end and their longer-maturity segments. This segmentation might affect term structure estimation, introducing distortions in longer-maturity yields, especially in parametric models. In order to deal with such segmentation, we propose a new model that combines the flexibility of spline functions with the parsimoniousness of a parametric four-factor exponential model. The short end of the yield curve is fitted using a B-spline function, while longer segments are captured by the parametric model. We illustrate the benefits of the proposed model for pricing and risk management purposes, using two examples: the real yield curve in the Brazilian government index-linked bond market, and the US Treasury nominal yield curve. We show that, in both markets, our model is simultaneously able to fit the yield curve well and to provide unbiased Value at Risk estimates for all tested portfolios of bonds, outperforming an important parametric benchmark model frequently adopted by central banks.

Keywords: Spline Models, Exponential Term Structure Models, Curve Fitting, Risk Management, Price Index.

JEL Code: C51, C58, G17.