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RICHARDSON HOGAN

Zero-coupon Yield Curves Springer
The paper developes a VAR macrofinance model of the Czech economy. It shows that yield misalignments from the yields implied by the macrofinance model partially determine subsequent yield changes over three to nine months. These yield misalignments tend to persist for a number of months. This persistence of the misalignments was explained by (a) the fact that the macro-economy influences asset markets only at lower frequencies, (b) the liquidity effect particularly during the times of capital inflows to Czech Republic, and (c) the fact that not all misalignments were greater than their historical one standard deviation.
Asset Allocation Perspective Elsevier
Following a meeting on the estimation of zero-coupon yield curves held at the BIS in June 1996, participating central banks have since been reporting their estimates to the Bank for International Settlements. The BIS Data Bank Services provide access to these data, which consist of either spot rates for selected terms to maturity or represent estimated parameters from which spot and forward rates can be derived. In the case estimated parameters are reported, the Data Bank Services provides, in addition to the parameters also the generated spot rates. The purpose of this document is to facilitate the use of these data. It provides information on the reporting central banks' approaches to the estimation of the zero-coupon yield curves and the data transmitted to the BIS Data Bank. In most

cases, the contributing central banks adopted the so-called Nelson and Siegel approach or the Svensson extension thereof. A brief overview of the relevant estimation techniques and the associated mathematics is provided below. General issues concerning the estimation of yield curves are discussed in Section 1. Sections 2 and 3 document the term structure of interest rate data available from the BIS. The final section provides examples of estimated parameter and selected spot and forward rates derived thereof. A list of contacts at central banks can be found after the references. The remainder of this document consists of brief notes provided by the reporting central banks on approaches they have taken to estimate the yield curves. Since the last release of this manual in March 1999 there have been four major changes: Switzerland started to report their estimates of the yield curve to the BIS in August 2002. Furthermore, Sweden began to use a new estimation method in 2001, the United Kingdom since September 2002 and Canada since January 2005. These changes are included in Tables 1 and 2.

Construction of Zero-Coupon Yield Curve from Coupon Bond Yield Using Australian Data Princeton University Press

In finance, an interest rate derivative is a financial instrument where the underlying asset is an interest rate at which payments are made based on a notional amount. A common approach to price interest rate derivatives is through the use of interest rate models. However, a drawback with this approach is that calibration of interest rate models does not involve the interest rate being modeled. Hence, calibrated models may not be good representations of interest rates and may not produce reliable derivative prices. To deal with the issue, we propose a time series modeling approach to analyze interest rates, specifically, the zero-coupon yield curves. In this approach, yield curves are modeled as functional data and we introduce models that are based on the well-known autoregressive model in time series analysis. The objective of this approach is to understand the dependency of the yield curves on historical data and to predict future yield curves before they are observed. The proposed models are illustrated and compared with the time series of US Treasury zero-coupon yield curves. We explore how individual models perform during different times in an economic cycle. We also propose a way to predict future caplet prices by combining yield curve prediction using functional time series models and historical implied volatilities of caplets. The time series approach that we propose are shown to work well against existing models such as the Hull-White model.

International Monetary Fund

Practical tools and advice for managing financial risk, updated for a post-crisis world Advanced Financial Risk Management bridges the gap between the idealized assumptions used for risk valuation and the realities that must be reflected in management actions. It explains, in detailed yet easy-to-understand terms, the analytics of these issues from A to Z, and lays out a comprehensive strategy for risk management measurement, objectives, and hedging techniques that apply to all types of institutions. Written by experienced risk managers, the book covers everything from the basics of present value, forward rates, and interest rate compounding to the wide variety of alternative term structure models. Revised and updated with lessons from the 2007-2010 financial crisis, Advanced Financial Risk

Management outlines a framework for fully integrated risk management. Credit risk, market risk, asset and liability management, and performance measurement have historically been thought of as separate disciplines, but recent developments in financial theory and computer science now allow these views of risk to be analyzed on a more integrated basis. The book presents a performance measurement approach that goes far beyond traditional capital allocation techniques to measure risk-adjusted shareholder value creation, and supplements this strategic view of integrated risk with step-by-step tools and techniques for constructing a risk management system that achieves these objectives. Practical tools for managing risk in the financial world Updated to include the most recent events that have influenced risk management Topics covered include the basics of present value, forward rates, and interest rate compounding; American vs. European fixed income options; default probability models; prepayment models; mortality models; and alternatives to the Vasicek model Comprehensive and in-depth, Advanced Financial Risk Management is an essential resource for anyone working in the financial field.

An Empirical Analysis of the Canadian Term Structure of Zero-Coupon Interest Rates John Wiley & Sons Incorporated

Since zero-coupon rates are rarely directly observable, they have to be estimated from market data. In this paper we review several widely-used parametric term structure estimation methods. We propose a weighted constrained optimization procedure with analytical gradients and a globally optimal start parameter search algorithm. Moreover, we introduce the R package termstrc, which offers a wide range of functions for term structure estimation based on static and dynamic coupon bond and yield data sets. It provides extensive summary statistics and plots to compare the results of the different estimation methods. We illustrate the application of the package through practical examples using market data from European government bonds and yields.

Analysing and Interpreting the Yield Curve Rozenberg Publishers

This book provides a secure grounding in the theory and practice of finance insofar as it deals with pension matters. By using it, the reader will understand the various types of investment assets; * the allocation of personal wealth to different asset classes * corporate pension finance * the financial aspects of defined contribution pension plans during both the accumulation and distribution phases * the financial aspects of defined benefit pension plans * the role of pension funds and pension fund management * pension fund performance measurement and attribution * risk management in pension funds

Corporate Bonds and Structured Financial Products John Wiley & Sons

This book uses a mathematical approach to deriving the laws of science and technology, based upon the concept of Fisher information. The approach that follows from these ideas is called the principle of Extreme Physical Information (EPI). The authors show how to use EPI to determine the theoretical input/output laws of unknown systems. Will benefit readers whose math skill is at the level of an undergraduate science or engineering degree.

Bayesian Smoothing Spline Models and Their Application in Estimating Yield Curves Springer Science & Business Media

U.S. Treasury Securities are crucially important in many areas of finance. However, zero-coupon yields are not observable in the market. Even though published zero- coupon yields exist, they are sometimes not available for certain research topics or for high frequency. Recently, high frequency data analysis has become popular, and the GovPX database is a good source of tick data for U.S. Treasury securities from which we can construct zero-coupon yield curves. Therefore, we try to fit zero- coupon yield curves from low frequency and high frequency data from GovPX by three different methods: the Nelson-Siegel method, the Svensson method, and the cubic spline method. Then, we try to retest the expectations hypothesis (EH) with new zero-coupon yields that are made from GovPX data by three methods using the Campbell and Shiller regression, the Fama and Bliss regression, and the Cochrane and Piazzesi regression. Regardless of the method used (the Nelson-Siegel method, the Svensson method, or the cubic spline method), the expectations hypothesis cannot be rejected in the period from June 1991 to December 2006 for most maturities in many cases. We suggest the possible explanation for the test result of the EH. Based on the overreaction hypothesis, the degree of the overreaction of spread falls over time. Thus, our result supports that the evidence of rejection of the EH has weaken over time. Also, we introduce a new estimation method for the stochastic volatility model of the short-term interest rates. Then, we compare our method with the existing method. The results suggest that our new method works well for the stochastic volatility model of short-term interest rates.

Zero-coupon Yield Curve Estimation Elsevier

Understand and interpret the global debt capital markets Now in a completely updated and expanded edition, this is a technical guide to the yield curve, a key indicator of the global capital markets and the understanding and accurate prediction of which is critical to all market participants. Being able to accurately and timely predict the shape and direction of the curve permits practitioners to consistently outperform the market. Analysing and Interpreting the Yield Curve, 2nd Edition describes what the yield curve is, explains what it tells participants, outlines the significance of certain shapes that the curve assumes and, most importantly, demonstrates what factors drive it and how it is modelled and used. Covers the FTP curve, the multi-currency curve, CSA, OIS-Libor and 3-curve models Gets you up to speed on the secured curve Describes application of theoretical versus market curve relative value trading Explains the concept of the risk-free rate Accessible demonstration of curve interpolation best-practice using cubic spline, Nelson-Siegel and Svensson 94 models This advanced text is essential reading for traders, asset managers, bankers and financial analysts, as well as graduate students in banking and finance.

The Handbook of Fixed Income Securities, Chapter 41 - The Market Yield Curve and Fitting the Term Structure of Interest Rates John Wiley & Sons

The term structure of interest rates, also called the yield curve, is the series of interest rates ordered by time to maturity at a given time. The smoothing spline as a nonparametric regression method has been used widely for fitting a smooth curve due to its flexibility and smoothing properties. In this dissertation, a class of Bayesian smoothing spline models is developed for yield curve

estimations under different scenarios. The first model is a Bayesian smoothing spline model under the Partially Informative Normal (PIN) prior for estimating Chinese Treasury yield curves. There are three main differences between our model and the Bayesian smoothing splines proposed by Speckman & Sun (2003). First, we focus on the natural cubic smoothing splines and use an easy computing formula for the precision matrix in the PIN prior. Second, we derive two formulas that can compute the inverse matrix and determinant for the smoothing matrix eciently. Third, we sample the smoothing parameter by using an efficient algorithm called the Ratio-of-Uniforms method. Through empirical studies of the Chinese Treasury bond yield data, we demonstrate that our model provides a better fit than the classical parametric models and the penalized spline model. The second model is the Bayesian multivariate smoothing spline model. Because there are typically few corporate bonds available for a company on the market, it is difficult to estimate the yield curve for corporate bonds. The proposed Bayesian multivariate smoothing spline model uses the PIN prior to smooth the time to maturity effect and incorporates the correlation among different yield curves. Thus, this model can be used to estimate the corporate bond yield curve by borrowing information from the Treasury bond term structure. In particular our method can obtain the yield curve for corporate bonds without modeling the credit spread as an interim. The third model is a Bayesian adaptive smoothing spline model, which is motivated by a Chinese Treasury bond yield data in which the smoothness varies signifiicantly. The intrinsic Gaussian Markov random fields prior for the adaptive smoothing spline is derived. A feasible computational form for posterior distributions is obtained through matrix transformations. Empirical results demonstrate that our method can handle the data very eciently. In practice, people are interested in fitting the yield to maturity curve, which gives a single yield that is used to discount multiple cash flows to get today's market price. However, another yield curve, called the zero-coupon yield curve, gives a yield that is used to discount a single cash flow at the cash flow's maturity date. In order to extract the zero-coupon yield curve from coupon bond prices, a Bayesian smoothing spline model is developed through Taylor expanding the model price to a linear approximation over the zero-coupon yield. To investigate the term structure and its evolution over time, a Bayesian thinplate spline model under a bivariate intrinsic Gaussian Markov random fields prior is developed to model the yield curves on cross and time series sections simultaneously. Finally, by deriving a linear mixed model representation for the smoothing spline regression, the framework for the Bayesian model selection in the smoothing splines is developed. Since an exact analytic evaluation of the integral in the Bayes factors computation is not possible, the Laplace-Metropolis estimator and importance sampling Monte Carlo integration are used for approximation. Power of test is evaluated and an application to the US zero-coupon yield data is analyzed.

Yield Curve Modeling and Forecasting McGraw Hill Professional

Bond Valuation, Yield Measures and the Term Structure covers the fundamentals of fixed income securities. The essentials of plain vanilla bonds, zero coupon bonds, and callable and

convertible bonds are discussed. The book also covers issues of day-count conventions and accrued interest. The book further dwells on:" Yield measures" Yield to maturity and its variations" Yield to call and portfolio yield

Yield Curves and Forward Curves for Diffusion Models of Short Rates John Wiley & Sons

Written for managers and professionals in business and industry, and using a minimum of mathematical language, The Management of Bond Investments and the Trading of Debt addresses three key issues: Bondholder’s options, risks and rewards in making investments in debt instruments; The dynamics of inflation, and how they affect both trading in the bond market, and investment decisions; and The democratization of lending, socialization of risk, and effect of the global economy on the bond market. Financial expert Dimitris Chorafas discusses these issues in straightforward language for managers and professionals in commercial banks, securities houses, financial services companies, merchandising firms, manufacturing companies, and consulting firms, placing the mathematical treatment of the issues in the appendices, available for study but not necessary for understanding the business issues addressed in the book. Focuses on new issues of central importance in bond and debt trading today Uses clear, straightforward language for managers and professionals in business and industry, with mathematical treatment provided in appendices Thorough treatment of operational risk new to books on this topic

Yield Curve Modeling and Forecasting Zero-Coupon Yield CurvesTechnical DocumentationFollowing a meeting on the estimation of zero-coupon yield curves held at the BIS in June 1996, participating central banks have since been reporting their estimates to the Bank for International Settlements. The BIS Data Bank Services provide access to these data, which consist of either spot rates for selected terms to maturity or represent estimated parameters from which spot and forward rates can be derived. In the case estimated parameters are reported, the Data Bank Services provides, in addition to the parameters also the generated spot rates. The purpose of this document is to facilitate the use of these data. It provides information on the reporting central banks' approaches to the estimation of the zero-coupon yield curves and the data transmitted to the BIS Data Bank. In most cases, the contributing central banks adopted the so-called Nelson and Siegel approach or the Svensson extension thereof. A brief overview of the relevant estimation techniques and the associated mathematics is provided below. General issues concerning the estimation of yield curves are discussed in Section 1. Sections 2 and 3 document the term structure of interest rate data available from the BIS. The final section provides examples of estimated parameter and selected spot and forward rates derived thereof. A list of contacts at central banks can be found after the references. The remainder of this document consists of brief notes provided by the reporting central banks on approaches they have taken to estimate the yield curves. Since the last release of this manual in March 1999 there have been four major changes: Switzerland started to report their estimates of the yield curve to the BIS in August 2002. Furthermore, Sweden began to use a new estimation method in 2001, the United Kingdom since September 2002 and Canada since January 2005. These changes are included in Tables

1 and 2.Zero-coupon Yield CurvesTechnical DocumentationZero-coupon Yield CurvesTechnical DocumentationZero-coupon Yield Curve Estimation from a Central Bank PerspectiveZero Coupon Yield Curve Estimation with the Package TermstrcSince zero-coupon rates are rarely directly observable, they have to be estimated from market data. In this paper we review several widely-used parametric term structure estimation methods. We propose a weighted constrained optimization procedure with analytical gradients and a globally optimal start parameter search algorithm. Moreover, we introduce the R package termstrc, which offers a wide range of functions for term structure estimation based on static and dynamic coupon bond and yield data sets. It provides extensive summary statistics and plots to compare the results of the different estimation methods. We illustrate the application of the package through practical examples using market data from European government bonds and yields.Zero-coupon Yield Curve EstimationA Principal Component, Polynomial ApproachYield Curve Modelling at the Bank of CanadaAnalysing and Interpreting the Yield Curve
In this dissertation we survey a variety of methods for constructing zero-coupon yield curves. We show that, when accuracy is of the utmost importance, the bootstrap described by Hagan and West (2006), Smit (2000), and Daeves and Parlar (2000) provides the ideal framework. This bootstrap requires the use of an interpolation algorithm, and a large portion of this dissertation will thus be devoted to the task of establishing an ideal method for interpolating yield curve data. Only two of the interpolation methods considered in this dissertation are seen to perform promisingly: the monotone convex method developed by Hagan and West (2006), and the monotone preserving r(t)t method developed in this dissertation. We show that the monotone preserving r(t)t method performs slightly better than the monotone convex method, in terms of the continuity of the forward curve, and in terms of the stability of the interpolation function. When economic appeal is of the utmost importance, we find parametric models to be more suitable than bootstrapping. However, we show that bootstrapping can be used to obtain a hypothetical set of zero-coupon bond prices, which can be used to calibrate parametric models. We compare the performance of the Nelson and Siegel (1987) and Svensson (1992) models, when applied to a historic set of South African swap curves, and show that the Svensson (1992) model performs better than the Nelson and Siegel (1987) model on a consistent basis. Copyright.
Empirical Application of the "Nelson and Siegel" Parsimonious Zero-coupon Yield Curve Model Elsevier
A book that shows why all zeros are not equal--and how to evaluate a deal before signing on the dotted line.
The Dynamic Nelson-Siegel Approach Lawrence R Rosen
Understanding the dynamic evolution of the yield curve is critical to many financial tasks, including pricing financial assets and their derivatives, managing financial risk, allocating portfolios, structuring fiscal debt, conducting monetary policy, and valuing capital goods. Unfortunately, most yield curve models tend to be theoretically rigorous but empirically disappointing, or empirically successful but theoretically lacking. In this book, Francis Diebold and Glenn Rudebusch propose two extensions of the classic yield curve model of Nelson and Siegel that are both theoretically rigorous and empirically successful. The first extension is the

dynamic Nelson-Siegel model (DNS), while the second takes this dynamic version and makes it arbitrage-free (AFNS). Diebold and Rudebusch show how these two models are just slightly different implementations of a single unified approach to dynamic yield curve modeling and forecasting. They emphasize both descriptive and efficient-markets aspects, they pay special attention to the links between the yield curve and macroeconomic fundamentals, and they show why DNS and AFNS are likely to remain of lasting appeal even as alternative arbitrage-free models are developed. Based on the Econometric and Tinbergen Institutes Lectures, Yield Curve Modeling and Forecasting contains essential tools with enhanced utility for academics, central banks, governments, and industry.

A Characterisation of Stationary and Unit Root Yield Curves Princeton University Press

The scope of this study is to estimate the zero-coupon yield curve of tomorrow by using Vasicek yield curve model with the zero-coupon bond yield data of today. The raw data of this study is the yearly simple spot rates of the Turkish zero-coupon bonds with different maturities of each day from July 1, 1999 to March 17, 2004. We completed the missing data by using Nelson-Siegel yield curve model and we estimated tomorrow yield cuve with the discretized Vasicek yield curve model.

Comparative Analysis of Zero Coupon Yield Curve Estimation Methods Using JGB Price Data Tata McGraw-Hill Education

Zero-coupon interest rates are the fundamental building block of fixed-income mathematics, and as such have an extensive number of applications in both finance and economics. The risk-free government zero-coupon term structure is, however, not directly observable and needs to be generated from the prices of marketable, coupon-bearing bonds. The authors introduce the first public-domain database of constant-maturity zero-coupon yield curves for the Government of Canada bond market. They first outline the mechanics of the curve-fitting algorithm that underlie the model, and then perform some preliminary statistical analysis on the resulting yield curves. The full sample period extends from January 1986 to May 2003; it is broken down into two subsamples, reflecting the structural and macroeconomic changes that impacted the Canadian fixed-income markets over that time. The authors examine the evolution of a number of key interest rates and yield-curve measures over the period, perform a principal-components analysis of the common factors that have influenced yield changes over time, and compare holding-period returns over the sample for assets of various maturities.

An Investigation Into Popular Methods for Constructing Yield Curves

A yield curve is a graph indicating the term structure of interest rates by plotting the yields of all bonds of the same quality. This book provides a thorough analysis of estimation techniques and a survey of yield curve interpretation. On the former it is the most advanced book in its field, on the latter it provides an introduction to more specialised texts. It also provides important insight into the latest thinking on these techniques at the Bank of England.

Exploratory Data Analysis Using Fisher Information

Due to economic feedback the actual risk in bonds from changes in Federal Reserve policy should generally be smaller than measured using conventional duration measures. We introduce

the notion of Federal Reserve policy durations. For example, target inflation duration, which measures the change in the price of a treasury bond that arises from a change in Central Bank target inflation rate that occurs at some time in the future before the maturity of the bond. For Central Banks following a policy setting rule such as a Taylor rule, we derive a simple analytic expression for the target inflation duration of zero coupon Treasury bonds in terms of model economic parameters and the parameters in the Taylor rule. The correction to the traditional duration of a zero coupon bond is proportional, at leading order, to the product of three terms: the Taylor rule output gap coefficient, the coefficient in the economy that determines the response of the output gap to the real rate, and the square of the maturity of the zero coupon bond.

All about CATs, STRIPs, TIGRs, LIONS, TRs, and TBRs - how to eliminate rate of reinvestment risk

From The Handbook of Fixed Income Securities--the most authoritative, widely read reference in the global fixed income marketplace--comes this sample chapter. This comprehensive survey of current knowledge features contributions from leading academics and practitioners and is not equaled by any other single sourcebook. Now, the thoroughly revised and updated seventh edition gives you the facts and formulas you need to compete in today's transformed marketplace. It places increased emphasis on applications, electronic trading, and global portfolio management.