

Interest Rate Term Structure Modelling

Workshop

Econometric Institute
Erasmus University Rotterdam

Friday September 28, 2007

Venue: Erasmus University Rotterdam, Burg. Oudlaan 50, JB-49

Organizers: Michiel de Pooter and Dick van Dijk

Local arrangements: Elli Hoek van Dijke, email: hoekvandijke@few.eur.nl

Programme

- 12.30-13.00 Registration and Welcome
- 13.00-13.40 **Siem-Jan Koopman** (Free University Amsterdam) - The Latent Factor Yield Model with Time-Varying Loadings and Volatility
- 13.40-14.20 **Francesco Ravazzolo** (Norges Bank) - Predicting the Term Structure of Interest Rates: Incorporating Parameter Uncertainty, Model Uncertainty and Macroeconomic Information
- 14.20-15.00 **Kees Bouwman** (Econometric Institute) – Modeling the US Term Structure with Risky Assets as Factors
- 15.00-15.20 Coffee and Tea
- 15.20-16.00 **Gerben de Zwart** (RSM Erasmus University and Robeco Asset Management) – The Cross-Section of Corporate Bond Returns
- 16.00-17.00 **Torben G. Andersen** (Kellogg School of Management, Northwestern University) - Do Bonds Span Volatility Risk in the U.S. Treasury Market? A Specification test for Affine Term Structure Models
- 17.00 Drinks

Participation in the workshop is free. Please register by sending an e-mail to Elli Hoek van Dijke (hoekvandijke@few.eur.nl) before Friday September 21.

Abstracts

“The Latent Factor Yield Model with Time-Varying Loadings and Volatility”

Siem-Jan Koopman (Free University Amsterdam), M.I.P. Mallee (Free University Amsterdam) and M. van der Wel (Free University Amsterdam)

In this paper we propose two extensions of the Nelson and Siegel (1987) latent factor yield curve model represented in state space form as suggested by Diebold, Rudebusch, and Aruoba (2006). The first extension is the introduction of a simple step function to allow the factor loadings parameter to be time-varying. This extension significantly increases the model fit. As an alternative, a spline function can be considered to allow for more flexible functional forms. The second extension is the inclusion of a time-varying function for a common volatility component. Both step and spline functions are considered for this purpose. We also illustrate how easily this modeling framework for the yield curve deals with missing entries in the multiple time series of different maturities. The new extensions are illustrated with some real data examples.

“Predicting the Term Structure of Interest Rates: Incorporating Parameter Uncertainty, Model Uncertainty and Macroeconomic Information”

Michiel de Pooter (Econometric Institute), **Francesco Ravazzolo** (Norges Bank) and Dick van Dijk (Econometric Institute)

We assess the relevance of parameter uncertainty, model uncertainty, and macroeconomic information for forecasting the term structure of interest rates. We study parameter uncertainty by comparing Bayesian inference with frequentist estimation techniques, and model uncertainty by combining forecasts from individual models. We incorporate macroeconomic information in yield curve models by extracting common factors from a large panel of macro series. Our results show that adding macroeconomic factors is beneficial for improving out-of-sample forecasts. Accounting for parameter uncertainty does not improve the forecast performance of individual models. The predictive accuracy of single models varies over time considerably and we demonstrate that mitigating model uncertainty by combining forecasts leads to substantial gains in predictability. Combining forecasts using a weighting method that is based on relative historical performance results in highly accurate forecasts. The gains in terms of forecast performance are substantial, especially for longer maturities, and are consistent over time.

“The Cross-Section of Corporate Bond Returns”

Jeroen Derwall (RSM Erasmus University), Joop Huij (RSM Erasmus University) and **Gerben de Zwart** (RSM Erasmus University and Robeco Asset Management)

This study provides a comprehensive evaluation of the explanatory power of factor models designed to describe the returns of investment-grade corporate bonds. A single-factor CAPM does a surprisingly good job in explaining the returns on bond portfolios with a medium to long-term maturity, but fails to successfully describe short-term bond returns. Moreover, the short-term bond return anomaly is not captured by multi-factor models that incorporate nonlinearities of the term structure as well as fundamental economic variables. To demonstrate the economic significance of this puzzle, we show that abnormal returns on short-term bonds are prevalent in both portfolios of individual corporate bonds and bond mutual funds. Our finding that multiple factors do not help and potentially hurt in describing the risk-return relation are reinforced by additional portfolio formations. Overall, our results make a strong case for the use of the single-factor CAPM. Our study has important implications for, e.g., performance evaluation and asset pricing.

“Modeling the US Term Structure with Risky Assets as Factors”

Paul Bekker (University of Groningen) and **Kees Bouwman** (Econometric Institute)

We introduce a new three-factor model for the US term structure that uses risky assets as factors. The model describes the yield and return volatility for bonds with a maturity over one year. The factors are asset prices of managed portfolios in a risky latent market that is described by a mean-variance frontier. Bond prices in this model are *affine* functions of the factors, which contrasts the popular class of affine term structure models where bond prices are *exponentially affine* functions of the factors. An exploratory analysis of the estimation results indicates that time-varying risk premia are a dominating factor in the relation between the term structure and the business cycle. Furthermore, a comparison of the short rate implied by the model and the Federal Funds target rate shows that the implied short rate leads the target.

“Do Bonds Span Volatility Risk in the U.S. Treasury Market? A Specification test for Affine Term Structure Models”

Torben G. Andersen (Kellogg School of Management, Northwestern University) and Luca Benzoni (Federal Reserve Bank of Chicago)

We investigate whether bonds span the volatility risk in the U.S. Treasury market, as predicted by most 'affine' term structure models. To this end, we construct powerful and model-free empirical measures of the quadratic yield variation for a cross-section of fixed-maturity zero-coupon bonds ("realized yield volatility") through the use of high-frequency data. We find that the yield curve fails to span yield volatility, as the systematic volatility factors are largely unrelated to the cross-section of yields. We conclude that a broad class of affine diffusive, Gaussian-quadratic and affine jump-diffusive models is incapable of accommodating the observed yield volatility dynamics. An important implication is that the bond markets per se are incomplete and yield volatility risk cannot be hedged by taking positions solely in the Treasury bond market. We also advocate using the empirical realized yield volatility measures more broadly as a basis for specification testing and (parametric) model selection within the term structure literature.

How to get to Erasmus University (Woudestein Campus)

By Car

Coming from the south (A16): First follow direction "Ring Rotterdam, Den Haag". Near Ridderkerk, take directions "Feijenoord / Centrum / Kralingen / Capelle". When crossing the Van Brienoordbrug, take exit "Rotterdam Centrum / Capelle" and you will immediately arrive on a roundabout. On the roundabout take "Rotterdam Centrum". Pass the Shell petrol station on your right side and take the first turn to the right after the Shell station. You have arrived at Burgemeester Oudlaan. Entrance of the Erasmus University main gate is 100 meters further on your right.

Coming from Utrecht and Den Haag: Follow directions "Ring Rotterdam / Dordrecht", and then "Kralingen / Feijenoord / IJsselmonde" and take exit "Capelle / Centrum". At the traffic lights follow "Rotterdam Centrum". Pass the Shell petrol station on your right side and take the first turn to the right after the Shell station. You have arrived at Burgemeester Oudlaan. Entrance of the Erasmus main gate is 100 meters further on your right.

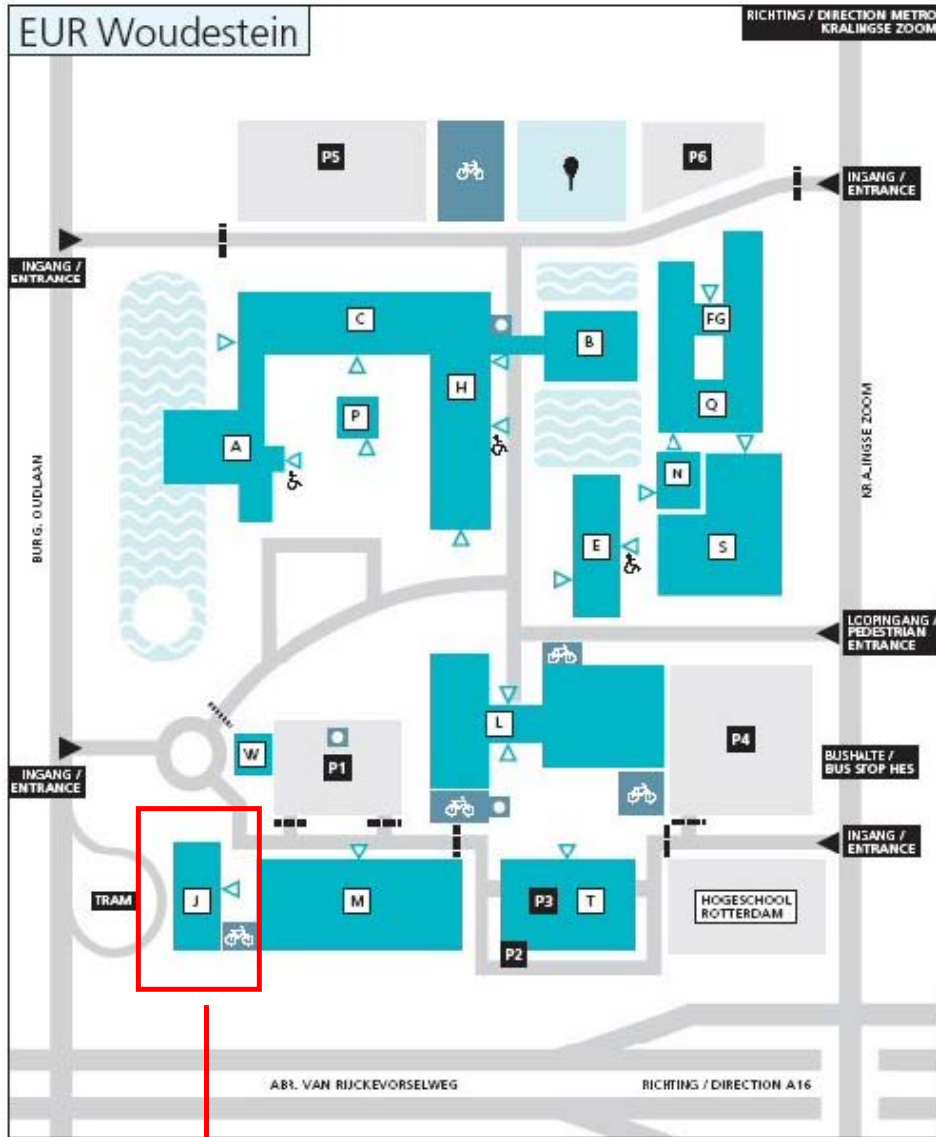
Parking is available on campus (parking fees will be charged).

By Public Transport

From Rotterdam Central Station "Centraal Station": Take the underground metro direction "Spijkenisse", change at "Beurs/Churchillplein". Take direction "Ommoord / Nesseland / Capelle", exit at "Kralingse Zoom". When exiting the station, facing the main road, the Erasmus University is directly across the road.

You can also take tram number 7 in the direction "Woudestein" or tram number 21 in the direction "De Esch", both of which leave at the front of the central station approximately every 10 minutes. The trip will take around 20 minutes. With tram 7, you should exit at the final stop "Woudestein", just behind the J-building. With tram 21, you should exit at the stop "Woudestein" (in front of the football stadium; note that this is not the final stop!), from which it is a three-minute walk to the university campus.

Woudestein Campus Map



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