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Inflation regimes in the US term structure of interest rates

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Abstract

This paper investigates how the regime shifts in the term structure of interest rates are related to changes in monetary policy. For this purpose, this paper introduces regime shifts into a cointegrated VAR model of the term structure. We argue that the short-run dynamics of the cointegrated model are likely to shift across regimes while the equilibrium relation implied by the expectations hypothesis of the term structure is robust to regime shifts. We find significant shifts in risk premia and interest rate volatility. These regime shifts reflect changing inflation expectations and shifts in the stance of monetary policy, respectively.

JEL classification: E43; E52

Keywords: Term structure; Monetary policy; Expectations hypothesis; Cointegration; Markov-switching

1. Introduction

The information content of the term structure of interest rates has been studied intensively. Despite the poor empirical performance of the leading theoretical model, the expectations hypothesis, the yield curve is widely used as an indicator of monetary and financial conditions. According to this theory, the spread between long-and short-term yields contains information about the future course of interest rates. This paper sidesteps these short-run issues and focuses on the long-run cointegration implications of the expectations hypothesis.

While the cointegration properties of the term structure are studied widely, another strand of multivariate modelling analyzes regime shifts in the stochastic processes generating interest rates. These lines of research are largely separate strands of the literature. Furthermore, recent research

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points to instability in the short-run dynamics of cointegrating models of the term structure. These studies either assume one-time structural shifts at predetermined dates or non-linearities governed by an observable threshold. Thus far the cointegration properties and the Markov-switching behavior have rarely been studied jointly.

This paper investigates how shifts in the stance and the strategy of US monetary policy are reflected in shifts in term structure dynamics. For this purpose, this paper provides a unifying approach and introduces regime shifts into the cointegrated VAR model of the term structure. The state variable is unobservable and the model endogenously determines the characteristics of the regimes and the break dates. Drawing on recent empirical research this paper argues that the cointegrating relation linking long and short yields is likely to be robust to regime shifts while the short-run dynamics including the term premium and the equilibrium adjustment are dependent on the prevailing unobservable regime. Thus, this paper reconciles fluctuations in stationary risk premia and error-correction parameters with the long-run equilibrium relation implied by the expectations hypothesis.

We fit a Markov-switching vector error-correction model (MS-VECM) to monthly US data where the risk premium, the short-run drifts, and the loadings are regime-dependent. Given the one-to-one cointegrating relation between 3-months and various long rates and, thus, the stationarity of risk premia, the model is able to detect discrete shifts in the stochastic process corresponding to well known episodes of US monetary policy.

The model identifies two distinct regimes that differ mostly with respect to interest rate volatility. We find that the high-variance regime prevails during the non-borrowed reserve-targeting episode of Federal Reserve policy in 1979–1982 and other periods of rising inflation expectations. Shifts to this regime imply increasing risk premia at the short end of the term structure and decreasing risk premia for longer maturities. This is consistent with decreasing long-run inflation expectations accompanied by increasing inflation expectations for a short horizon up to 12 months. Furthermore, the adjustment of long rates towards the equilibrium yield spread is much faster when interest rate volatility is high. A second regime reflects the stable post-1987 period characterized by low premia for short and intermediate maturities, low volatility, and small expected changes in long-horizon interest rate forecasts.

The paper is closely related to the recent work by Clarida et al. (2006). These authors also employ a Markov-switching VECM to model interest rates across the maturity spectrum. As a key difference, however, this paper translates regime-dependent VECM constants into regime-dependent risk premia. Moreover, the paper shows that inflation expectations play a key role in explaining the regime-switching pattern in US interest rates.

The plan of the paper is the following: The Next section derives the cointegrating properties from a simple exposition of the expectations hypothesis and provides a brief review of the literature. Section 3 sets up a linear VECM and tests the cointegrating properties for U.S. data while Section 4 proposes a regime-switching VECM approach and Section 5 interprets the findings in detail. Section 6 finally concludes.

2. Information in the term structure of interest rates

This section gives a brief overview of the recent research on the equilibrium relationship between interest rates of different maturity. We first derive the cointegrating properties implied by a standard formulation of the expectations hypothesis of the term structure and then survey the existing evidence with a special focus on the regime-shifting behavior of interest rates and, hence, the term structure.