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Journal of Monetary Economics 53 (2006) 1377–1393
Journal of MONETARY ECONOMICS
www.elsevier.com/locate/jme

Taylor rules and the term structure ☆

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Received 30 March 2005; accepted 18 May 2005

Abstract

The expectations model of the term structure has been subjected to numerous empirical tests and almost invariably rejected, with the failure generally attributed to systematic expectations errors or to shifts in risk premia. Rules for monetary policy designed along the lines of Taylor [1993. Discretion versus policy rules in practice. Carnegie-Rochester Conference Series on Public Policy 39, 195–214] specify that the central bank adjusts short-term yields in response to deviations of inflation and output gaps from target level. Such rules give a good empirical account of the behavior of the short-term interest rate. Combining the Taylor rule and expectations theory, it is possible to generate—along lines pioneered by Campbell and Shiller [1987. Cointegration and tests of present value models. Journal of Political Economy 95, 1062–1088]—a series of theoretical long-term interest rates. When such theoretical rates are calculated for the US over 1980–2004, considerable support for the expectations theory emerges.
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JEL classification: E41; E44; E52

Keywords: Small macroeconomic models; Term structure of interest rates; Expectations theory

☆The title of this paper was originally suggested by Rudi Dornbusch. Of the many privileges I had in my life, meeting Rudi and working with him was one of the most extraordinary. I would like to thank also Alejandro Cunat, Francesco Giavazzi, Massimo Guidolin, Alessandro Missale, Tommaso Monacelli, Glenn Rudebusch, Guido Tabellini, Luca Stanca, and the participants of seminar at the Federal Reserve Bank of Atlanta, at the Bank of Spain, at ECARES in Brussels, at the EMUConference at the State University of Milan and the Macroeconomic workshop at Bocconi University for helpful comments. I am also indebted to the editor, R.G. King, and an anonymous referee, who provided many very insightful comments and suggestions.

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doi:10.1016/j.jmoneco.2005.05.007

1. Introduction

The expectations model of the term structure states that the yields to maturity of long-term bonds are equal to the average of expected future short-term bond yields.[1]

This venerable model has been subjected to numerous empirical tests and almost invariably rejected,[2] with the failure generally attributed to systematic expectations errors or to shifts in risk premia.

Rules for monetary policy designed along the lines of Taylor (1993) specify that the central bank adjusts short-term yields in response to deviations of inflation and output gaps from target level. Such rules give a good empirical account of the behavior of the short-term interest rate: because (expected) inflation and output gaps are highly persistent, the policy rate is very persistent and forecastable, at least at short horizons. Combining the Taylor rule and expectations theory, it is possible to generate—along lines pioneered by Campbell and Shiller (1987)—a series of theoretical long-term interest rates. When such theoretical rates are calculated for the US over 1980–2004, considerable support for the expectations theory emerges, in ways that are discussed further below, which is even stronger than that provided by Campbell and Shiller (CS).[3]

The analysis in this article has two important implications. First, for economists interested in the pricing of long-term bonds, it shows that the empirical performance of the expectations theory is enhanced by consideration of a macroeconomic model of short-term interest rate determination. Second, for economists interested in monetary policy, including those involved with policy-making in central banks, it reinforces the view that, for economies like the US, it is appropriate to use the term structure as a guide to private sector expectations about future monetary policy and that markets understand the general workings of monetary policy as summarized by the Taylor rule. Turning to the details, the article begins by briefly reviewing the CS methodology and highlighting the modification of it used in the paper. It then proceeds to investigating the empirical performance of the term structure model, under the assumption of a Taylor-type interest rate rule.

There are four aspects of the method and the results that are worth highlighting.

First, rather than use a bivariate relationship between short and long rates, as in CS, we study the relation between long-rates of varying horizons and policy rates predicted on the basis of macroeconomic variables, such as inflation and the output gap. If we re-interpret the bivariate VAR of CS in the light of the success of Taylor rules, it is then clear that considering a bivariate VAR representation is a first step forward from the traditional limited information approach, based on the estimation of single-equation models and on the assumption that realized returns are a valid proxy for expected returns.[4] In a recent

[1]This relation is obtained directly when assuming that expected continuously compounded yields to maturity on all discount bonds are equal (see Fama, 1984). It can also be derived as a linear approximation to any of the different non-linear expectations theory of the term structure (see Shiller et al., 1983).

[2]See, for example, the textbook treatment in Campbell et al. (1997, Chapter 10), or Patterson (2000, Chapter 11).

[3]Recently Bekaert and Hodrick (2000) have argued that the problem leading to the rejection of the theory in CS could be the use of asymptotic inference rather than omitted variables. Their use of small sample distributions of the different VAR based tests leads to much less dramatic rejections than those implied by the asymptotic distribution.

[4]Campbell (1995) shows that high yield spreads fare poorly in predicting increases in long rates, Fama and Bliss (1987) show that the change in yields does not move one-to-one with the forward spot spread, Cochrane (2001) points out that period excess returns on long-term bond are predictable using the information in the forward-spot spread.

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