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The decline in the predictive power of the US term spread: A structural interpretation

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ABSTRACT

Numerous studies have found the term spread to be a significant predictor of future real output growth. However, in the case of the US, the term spread's predictive power has diminished from the mid-1980s till present. This paper provides new evidence to the debate on why the term spread leads output growth. We do this by structurally accounting for the decline in the predictive power of the US term spread. Our findings indicate that it is changes to the composition of shocks hitting the US economy which has caused the term spread, through the endogenous monetary policy response, to be a less reliable indicator of future output growth in recent decades.

1. Introduction

Following Burns and Mitchell (1935), macroeconomists have long recognised that spot interest rates contain useful information concerning the state of the business cycle. Short-term spot rates are predominantly influenced by the monetary authority and are set in accordance with its goals of output and inflation stabilisation. The macroeconomist's view, which assumes the expectations hypothesis,[1] posits that long-term spot rates are then determined by expectations of future short-term interest rates which will in turn be influenced by expected deviations in inflation and output from trend. The information implied by the term structure, therefore, carries important practical implications, such that it is extensively monitored by policy makers and market participants when formulating their respective policy and investment choices.

Kessel (1965) documented that the gap between short and long-term spot interest rates, the term spread, tended to move with the business cycle. The authour noted that the term spread tended to narrow prior to a slowdown in economic activity and widen prior to an economic expansion. Indeed, since the inclusion of interest rate spreads in Stock and Watson's (1989) index of leading indicators,[2] studies evaluating the forecasting power of the term spread has been an active area of empirical research. The seminal contributions of Laurent et al. (1989), Chen (1991) and Estrella and Hardouvelis (1991) find evidence within a linear regression framework that the US term spread helps predict growth in real output.[3] Moreover, using a discrete-choice model, Estrella and Hardouvelis (1991) find additional evidence of the term spread to be a reliable forecaster of US recessions.[4]

However, in the case of the US, the accuracy of the term spread in predicting real activity has significantly diminished from the

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[1] The expectations hypothesis implies that the expected excess return on long-term bonds over short-term bonds is constant over time and dependent upon maturity. In its purest form, the pure expectations hypothesis, says that these expected excess returns are zero (Lutz, 1940).

[2] Specifically, the authours include information on the difference between the 10 year Treasury bond rate and 3-month bill rate and the difference between the 6-month commercial paper rate and 6-month Treasury bill rate.

[3] See Plosser and Rouwenhorst (1994), Bernard and Gerlach (1998) and Estrella and Mishkin (1997) for evidence outside of the US on the term spread's ability to forecast real output.

[4] See Wheelock et al. (2009) for a comprehensive survey on the various techniques used in the literature to evaluate the predictive power of the term spread.

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mid-1980s (Haubrich and Dombrosky, 1996; Smets and Tsatsaronis, 1997; Dotsey, 1998; Estrella et al., 2003; Bordo and Haubrich, 2004; 2008; Jardet, 2004; Giacomini and Rossi, 2006). In light of this finding, this paper seeks to provide a structural interpretation for the decline in the predictive power of the US term spread. As such, our work is therefore directly related to those analyses examining the theoretical basis for the term spread's predictive power.

Our paper is most similar to Feroli (2004) in that our analysis considers a DSGE model to elucidate the predictive power of the term spread in terms of the structure of the economy and the functional form of Central bank's monetary reaction function. However, we differentiate our analysis by using our DSGE model to provide a structural interpretation for the potential explanations behind the term spread's structural break in predictive power. We then supplement our structural analysis with reduced-form experiments, so that we are able to statistically discriminate among potential competing explanations.

The first contribution of our paper is to investigate whether the reduction in the term spread's predictive power may be due to the presence of time-varying term premia (TVTP). As discussed by Rosenberg and Maurer (2008) and Dewachter et al. (2014), the presence of TVTP not only invalidates the expectations hypothesis, but, in the content of macroeconomic forecasting, may potentially obfuscate the information content of the term spread. This is particularly relevant in the instance that changes in the quantity of term premia demanded by investors are less connected to future US macroeconomic developments and are more likely the result of idiosyncratic developments unique to the US bond market.[5] To properly evaluate the role of TVTP in our analysis a decomposition of the term spread is warranted. We thus use our DSGE model to decompose the term spread into an expectational component and a component that is representative of TVTP. Consistent with other relevant reduced-form analyses, we then regress future real GDP growth on both term spread components. We find, however, limited support for the TVTP explanation in that the risk-adjusted term spread is reported to be statistically insignificant in that part of our sample characterised by a loss in term spread predictive power.

As discussed by Bordo and Haubrich (2004), Feroli (2004) and Estrella (2005), the accuracy of the spread's predictive power will also be affected by changes in the conduct of monetary policy and the structure of the economy. In order to examine if changes in these features played a role in the decline in term spread predictive power, we estimate a medium scale New-Keynesian DSGE model over two sub-samples. The first sub-sample is characterised by high predictive power in the term spread while the second sub-sample is distinguished by a loss of predictive power. We then compare our sub-sample parameter estimates to highlight several features of both the structure of the US economy and in the operating behaviour of the Federal Reserve that may have been conducive to the high predictive power present in the first sub-sample. Using our structural model, we then generate various counterfactual paths of the term spread by changing the values of those parameters deemed to be important for the spread's predictive power. Each counterfactual term spread series is then regressed on future output. It is the statistical evaluation of the respective term spread coefficients that then allows us to pin down the most likely explanation behind the decline in the term spread's predictive capacity.

The results of our counterfactual analysis suggest that the recent decline in term spread predictive power may be explained by changes in the relative importance of shocks in accounting for US term spread fluctuations.

To provide further insight into this result, we perform a structural correlation decomposition so that we may highlight which shocks account for the unconditional correlation between the term spread and future real output growth. We find that shocks to the marginal efficiency of investment account for the dominant share of the unconditional correlation between the term spread and future output growth in that part of our sample characterised by a loss of predictive power. Conditional on this shock, we observe an instantaneous decrease in the term spread response despite positive increases in future growth rates of real output. Clearly, such responses are inconsistent with the notion that the term spread is a leading procyclical variable. In this regard, our results are therefore supportive of those papers finding the role of systematic monetary policy to be the decisive factor behind the term spread's forecasting capacity (Bernanke, 1990; Bernanke and Blinder, 1992; Smets and Tsatsaronis, 1997; Jardet, 2004; Kurmann and Otrok, 2013).

The rest of this paper is structured as follows. Section 2 motivates the paper by reviewing the instability in the term spread's predictive power through the use of regression analysis. Moreover, we also offer a review of the competing theories put forward to explain the term spread's predictive power. In Section 3 we provide a rough sketch of the details of our model in addition to discussing the estimation procedure employed in this paper. Section 4 reports and discusses the main results of our paper. In the first section, we report our results that are relevant for the role of TVTP on the predictive power of the term spread. The second section presents the results of our counter-factual experiments. Section 5 concludes.

2. Time variation in the predictive power of the term spread

Typically, in testing the term spread's ability to forecast the cumulative growth in future output, the extant literature has opted for estimating a linear regression of the form:

$$(400/k)(\ln Y_{t+k}^{D} - \ln Y_{t}^{D}) = \alpha_0 + \alpha_1 SP_t^D + \varepsilon_t \tag{1}$$

where Y_{t+k}^{D} denotes the level of real GDP at quarter $t + k$ and SP_t^D represents the term spread, which is constructed by subtracting the 3-month Treasury bill rate from the 10-year Treasury bond rate. To highlight previous results we estimate (1) on US quarterly data spanning from 1966:1–2006:4. The results of this exercise are presented in Table 1 and are indicative of two key regularities:

[5] For example, the Global Saving Glut and increased regulatory pressures forcing pension companies to hold long-term US paper have both contributed to the recent compression in the 10 year US term premium. See Rachel and Smith (2015) for a comprehensive overview of the factors driving the secular decline in long-term interest rates.