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Macro-expectations, aggregate uncertainty, and expected term premia

Christian D. Dick [a], Maik Schmeling [b,*], Andreas Schrimpf [c,1]

[a] Centre for European Economic Research (ZEW) Mannheim, P.O. Box 10 34 43, 68034 Mannheim, Germany
[b] Faculty of Finance, Cass Business School, City University London, 106 Bunhill Row, London EC1Y 8TZ, UK
[c] Centralbahnplatz 2, Bank for International Settlements, 4002 Basel, Switzerland

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ABSTRACT

Based on expectations data from the Survey of Professional Forecasters (SPF), we construct a real-time proxy for expected term premium changes of US long-term Treasury bonds. We then investigate the economic drivers of these subjective term premium expectations at the level of individual forecasters. Our results indicate that forecasters' term premium expectations are driven by expected macroeconomic conditions as well as the uncertainty of market participants about future output and inflation. An aggregate measure of forecasters' term premium expectations has predictive power for actual bond excess returns over horizons of up to one year.

1. Introduction

Using panel data from the Survey of Professional Forecasters (SPF), we construct a simple proxy of forecaster-specific expectations about changes in future term premia. Our proxy is model-free, available in real-time from survey data, and basically captures the flip side of expected bond excess returns.[2] Based on this proxy, we empirically investigate the economic drivers of term premium expectations at the individual forecaster level and find that expected term premium changes are closely linked to expected output growth and inflation, as well as forecasters' uncertainty about future output and inflation. Furthermore, an aggregate version of our survey-based proxy forecasts actual bond excess returns for horizons of up to one year.

There is ample evidence that the expectations hypothesis does not hold empirically and that investors demand a (time-varying) compensation for bearing the higher risk of holding long-duration assets. These term premia – or bond risk premia – demanded by investors drive a wedge between expected future short rates and longer-maturity rates. Since the

* Corresponding author. Tel.: +44 20 7040 8212; fax: +44 20 7040 8881.
E-mail addresses: dick@zew.de (C.D. Dick), maik.achmeling.1@city.ac.uk (M. Schmeling), andreas.schrimpf@bis.org (A. Schrimpf).
[1] Tel.: +41 61 280 8942.

[2] In fact, the correlation between our proxy of expected term premium changes and expected future bond excess returns is almost perfectly negative, because rising investors' expectations about future term premia imply a decline in expected bond prices in the future, and, hence, lower expected bond excess returns from today's perspective.

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latter are crucial for spending and investment decisions in the economy, term premia are highly relevant in many branches of macroeconomics and finance. The literature has convincingly demonstrated that term premia are time-varying and at least partly driven by the state of the business cycle (see e.g. Cochrane and Piazzesi, 2005; Ludvigson and Ng, 2009). As this adds complexity to the conduct of monetary policy (traditionally focused on controlling short-term interest rates) and has a crucial impact on investment and borrowing decisions of the private and public sector, an active field of research in macroeconomics and finance is devoted to a better understanding of time-varying risk premia in bond markets (see e.g. Ang and Piazzesi, 2003; Rudebusch, 2010; Wright, 2011).

This paper contributes to the literature by studying the link between the macroeconomy and bond risk premia. While existing studies typically investigate aggregate measures of term premium estimates derived from asset prices, we focus on survey-based term premium expectations at the level of *individual* forecasters. This approach has three advantages: First, relying on survey information allows us to focus on the role of forward-looking macro-expectations as drivers of term premium expectations, whereas most earlier papers focus on the impact of current macroeconomic conditions.[3] Second, the forecasters in our panel naturally differ in their expectations about future macroeconomic conditions and bond prices. This allows us to exploit cross-sectional variation to conduct more powerful inference when investigating the empirical determinants of expected bond term premia.[4] Third, relative to pure time-series analyses of bond risk premia where future bond returns are regressed on current macroeconomic variables (e.g. Ludvigson and Ng, 2009) or other bond market predictors (e.g. Cochrane and Piazzesi, 2005), our survey-based approach has the advantage that it delivers an observable proxy for changes in term premium expectations and, equivalently, expected excess returns (available in real-time). Hence, we do not have to estimate expected returns (or term premia) to look at links between macro-variables and bond risk premia, which would come at the cost of additional estimation uncertainty. Overall, the explicit focus on forward-looking macroeconomic variables and the use of individual real-time expectations is a novel aspect of our analysis compared to earlier literature.

Besides these advantages, there are of course also some shortcomings associated with the use of survey data. For instance, forecasters in surveys may potentially give strategic forecasts (see e.g. Ottaviani and Sorensen, 2006). Under such circumstances, survey forecasts would not fully reveal the true expectations of market participants. However, the professional forecasts collected in our case are anonymous, which should reduce incentives for strategic forecasting substantially. A second shortcoming of survey data may be that the answers to a survey are often collected over a time span rather than a single point in time, which complicates merging survey data to macro-data with a sensible timing. This disadvantage, however, should be limited due to the quarterly frequency of our data.

Our main interest lies in the empirical drivers of subjective term premium expectations of market participants in bond markets. In particular, we are interested in their relation with expected future key macro-business cycle variables – output growth and inflation – as well as aggregate macroeconomic uncertainty. In particular inflation uncertainty has received a large amount of attention as a driver of bond risk premia in previous studies (Piazzesi and Schneider, 2006; Buraschi and Jiltsov, 2005; Wright, 2011).[5] Thus, we regress individual term premium expectations on individual expectations about future real GDP growth and inflation (and instrument for these contemporaneous macro-expectations). In addition, we study the impact of measures of aggregate GDP and inflation uncertainty while controlling for lagged individual term premium expectations and further variables.

Our findings suggest that nominal factors (in particular inflation uncertainty) do matter for investors' subjective term premium expectations. However, real factors (expected output growth and uncertainty about future output growth) tend to dominate nominal factors. This finding corresponds to the result by Piazzesi and Schneider (2006) that real factors have dominated nominal factors after the early 1980s. Our analysis further shows that the relative importance of real factors as drivers of subjective risk premia has further risen with the onset of the financial crisis. We find that expectations of a rise in output growth imply expectations of higher term premia going forward, which is equivalent to lower expected future bond returns. This result makes sense from a standard asset pricing perspective where good states of nature are associated with a lower risk compensation. We find that higher uncertainty about future output and inflation leads forecasters to expect lower bond excess returns. This seems consistent with a flight-to-quality effect for U.S. treasury bonds in times of high uncertainty. Furthermore, we investigate the relation of our term premium expectations with classic yield curve factors (level, slope, and curvature) as well as the Cochrane and Piazzesi (2005) return forecasting factor. We find that the level and slope of the yield curve seem to capture effects similar to our measures of aggregate uncertainty, which sheds some light on the economic forces underlying these two yield factors. Curvature, in turn, appears to be related to forecasters' term premium expectations themselves, which lines up with findings in Cochrane and Piazzesi (2008).

[3] One exception is Chun (2011) who also studies the impact of macro-expectations on term premia. However, Chun works at the aggregate level and does not study a panel of forecasters.

[4] For instance, consider the extreme case of only two investors where one forecaster expects a rise in the inflation rate of $+2\%$ and rising term premium of 1% and the other expects a decline in the inflation rate of -2% and a declining term premium of -1%. A panel regression will easily identify a positive relation between inflation expectations and term premia, whereas an aggregate analysis, relying on cross-sectional averages, will have little power to detect a significant relation since average inflation and term premium expectations will be equal to zero.

[5] To obtain an upward-sloping yield curve Piazzesi and Schneider (2006) assume that news about higher inflation implies bad news for future consumption growth and that investors are averse to persistence. In that model, term spreads are high in times when inflation news are harder to interpret. Buraschi and Jiltsov (2005) present a real business cycle model in which inflation risk matters for bond premia. They argue that the impact of inflation uncertainty is larger for long maturities, leading to positively sloped yield curves.