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Bond futures, inflation-indexed bonds, and inflation risk premium

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ABSTRACT

We propose a new approach to measuring long-run inflation risk, the inflation risk premium, and inflation expectations for the UK over the period 1985–2012. By adding long-term bond futures to the information set of inflation-indexed and nominal bonds, inflation risk is measured as an incremental time-varying covariance obtained from a trivariate GARCH model with dynamic conditional correlations (DCC). The time-varying inflation risk premium and inflation expectations are extracted from the breakeven yield using the risk premium obtained from the previous step. We find that the risk premium has been decreasing over the sample period, with an average value of 87 basis points. The estimated long-run inflation expectations suggest that credibility has been improving over the period of inflation targeting policy, and are in line with the role of inflation targeting policy in anchoring expectations.

1. Introduction

The long-run inflation risk premium and inflation expectations are important for investors with long-run investment horizons, for pricing recently developed inflation options and other macroeconomic derivatives, and for monetary policy makers. In the present study, we put forward a new approach to estimating this premium with the following features. First, we employ the long-term bond futures market in conjunction with the 10-year nominal bond market and the 10-year inflation-indexed bond market. Second, inflation risk is measured as an "incremental" conditional covariance,

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the difference between the covariance of nominal bonds and bond futures, and the covariance of inflation-indexed bonds and bond futures. Third, the latter two covariances are obtained from a trivariate Vector Autoregressive (VAR) GARCH model with a dynamic conditional correlation (DCC) structure (Engle, 2002), containing the nominal bonds yield change, the inflation-indexed bonds yield change, and the long-term bond futures return. The incremental covariance measuring inflation risk, being based on time-varying covariances, is itself time-varying satisfying the desirable property of time-variance suggested by Grischchenko and Huang (2008), and Buraschi and Jiltsov (2005). We use this inflation risk measure to derive inflation expectations and the risk premium from the yield spread between the nominal bond and the inflation-indexed bond (breakeven yield). Lastly, we take account of possible spillovers in the specification of the conditional mean equations and thus, filter away potential dependencies across the three markets. Our approach is applied to the UK for the period 1985–2012.

The addition of the long-term bond futures market to the information set is a major innovative aspect of our approach. Previous contributions have considered approaches based on nominal and real term structures, macro and real yields, and survey inflation expectations only (Evans, 1998; Foresi et al., 1997; Campbell and Shiller, 1996; Gong and Remonola, 1996; Levin and Copeland, 1993; Madureira, 2007; Hördahl, 2008; Joyce et al., 2010; Garcia and Werner, 2010). Though, the relevance of bond futures in reflecting inflation expectations is well justified in the literature. On a theoretical front, Kuttner (2001), Labadie (2004), Lioui and Poncet (2005), and Schubert and Broll (2005) have shown that policy expectations affect bond futures and that futures markets are useful in assessing the inflation risk premium. Furthermore, numerous studies (Hardouvelis, 1988; McQueen and Roley, 1993; Edison, 1996; Becker et al., 1996) have provided substantial empirical evidence that inflation uncertainty has an impact upon bond futures. Fleming and Remolona (1997), Kim and Sheen (2001), Kuttner (2001), and Christie-David et al. (2003) also found significant unexpected inflation effects upon bond futures.[1] In addition, there is evidence that bond futures prices become more volatile around announcements on monetary policy, implying that there exists a link between such futures and policy-related events (European Central Bank, Monthly Bulletin, January 2006, pages 57, 59). This literature suggests that information contained in bonds futures carries added value in measuring inflation risk.

Our results show that over the period 1985–2012, the average premium was 87 basis points (bp) and statistically significant, which signals a violation of the Fisher hypothesis and the manifestation of an 'extended' Fisher equation allowing for inflation risk. As the risk premium is a 'cost' of issuing inflation-indexed bonds by governments (Reschreiter, 2004), our results contribute to literature on the costs and benefits of real debt by documenting the existence of time-varying costs in issuing such bonds. Our findings on inflation expectations suggest that the inflation targeting policy in the UK yielded tangible benefits in reducing expected inflation and bringing increased credibility. These results indicate that the UK monetary policy was successful in anchoring expectations (Capistran and Ramos-Francia, 2010; Blanchflower and Kelly, 2008).

The remainder of the paper is as follows. Section 2 outlines the theoretical background and its empirical implications. Section 3 discusses the econometric methodology. Section 4 provides details on the markets and outlines the data set. Section 5 discusses the empirical findings and their economic implications. Finally, Section 6 concludes.

2. Theoretical background and empirical implications

Breedon and Chadha (2003) derived an extended Fisher equation which describes the relation between the nominal and real interest rate. Following Lucas (1982) in employing a cash-in-advance economy in which the household maximizes lifetime utility subject to the beginning of period money transfers ($v_t M_{t-1}$), real endowments (ψ_t), and maturing bond payoffs, household's wealth comprises

[1] There has also been significant anecdotal evidence on the linkage between bond futures markets and inflation expectations. For instance, see 'Australian bond futures slump as domestic inflation expectations rise' (Dow Jones News Wire, May 22, 2008). Another example refers to reports that Japanese government bond futures were negatively affected by inflation scare (Reuters, Global Markets, 25 April 2008).