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The predictive content of the term premium for GDP growth in Canada: Evidence from linear, Markov-switching and probit estimations

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ABSTRACT

The objective of this study is to assess the predictive content of the term premium for future GDP growth in Canada over the past 55 years. The term premia for average long-term bond yields for four maturity categories are derived using the stationary vector-stochastic process for the expectation hypothesis of Campbell and Shiller (1987, 1991). The bivariate VAR model identifies term premia for the bond yields that are mean-stationary and increase on average to about 100 basis points. The coefficients on the expectations components of the term spreads in linear estimations are found to be equal to those on the term premium components for all maturity categories, suggesting that there is no additional information about future GDP growth in the term premium components. However, regime-switching estimations that stochastically divide the sample period into high- and low-variance regimes indicate that the equality of the coefficients on both components of the term spreads can easily be rejected for all maturities in both regimes. The expectations component is found to be more important than the term premium component when future output growth is volatile, while it is not found to be important during 'normal times' when the variability of GDP growth is relatively low. Probit model estimations suggest that the expectations component of the term spread (removing the term premium component) produce relatively more reliable predictions of future recessions than the term premium component, which has only marginal information for predicting future recessions.

1. Introduction

The spread between long- and short-term interest rates has long been viewed as being useful for predicting GDP growth and forecasting recessions in the United States.¹ Similarly, for Canada, the long-term yield spread has been established as being a particularly accurate predictor of output growth and quite useful for forecasting recessions.² Generally, the slope of the yield curve has been viewed as reflecting the relation between the policy-influenced, short-term rate and the equilibrium rate of return on real investment. In this interpretation, the slope is believed to gauge the impact of the current stance of monetary policy on current and future economic activity if bond market expectations embody the long-run forces appropriately. Consequently, a narrowing or

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¹ See the original studies for the United States by [Estrella and Hardouvelis \(1991\)](#) and [Hardouvelis \(1994\)](#) for output growth and [Estrella and Mishkin \(1998\)](#) for recessions.

² See [Cozier and Tkacz \(1994\)](#), [Harvey \(1997\)](#), [Hassapis \(2003\)](#) and [Venetis, Paya, and Peel \(2003\)](#) for output growth and [Atta-Mensah and Tkacz \(2001\)](#) for recessions in Canada.

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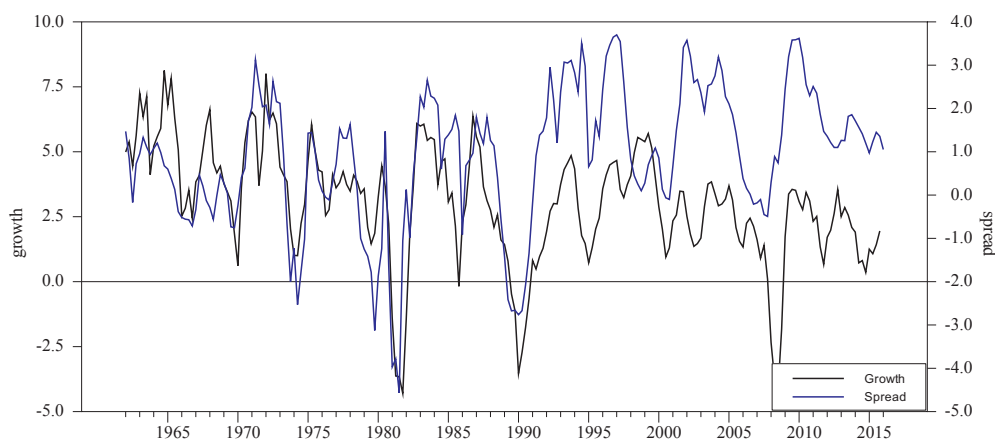


Fig. 1. 4-Quarter-ahead GDP growth and the spread between the 10-plus year bond yield and the 90-day paper rate.

widening of the slope of the yield curve could be expected to have important effects on current and future interest-sensitive expenditures.³

Fig. 1 presents the 4-quarter-ahead growth of real GDP and the spread between the 10-plus year bond yield and the 90-day paper rate in Canada.⁴ The correlation between the two series has been quite close, almost perfect up until about 1991, with an overall correlation coefficient of about 0.40 for the period from 1962Q1 to 2016Q4.

The purpose of this study is to evaluate the role of the term premium in the predictive relationship between long-term yields and future output growth and recessions. The empirical results in the recent literature are quite mixed with some studies finding a robust role for the long-term premium in bond yields with a positive coefficient on the term premium (e.g. Hamilton and Kim (2002)), while other studies find that the term premium has no predictive power for future GDP growth with an insignificant coefficient on the term premium (e.g. Ang, Piazzesi, and Wei (2006)), or a negative coefficient which is only marginally significant (e.g. Rudebusch, Sack, and Swanson (2007)).

The role of the term premium is important from a policy point of view because if the term premium just contaminates the expectations contained in the yield curve, then the term or risk premium should be subtracted from the term spreads for the purposes of predicting GDP growth and forecasting recessions. Similarly, investment practitioners may benefit from understanding if fluctuations in interest rates in debt markets are due only to changes in term premia if they affect the hedging strategies of investors in those markets. Also, investors that extract expectations of future interest rates from the yield curve to predict future versus current borrowing costs may also benefit by not discounting the effects of relatively large movements in current bond yields that are due to movements in term premia.

The main contribution of this study is the decomposition of the two unobservable components of the longer term yields – expectations and term premium components – using the stationary vector-stochastic VAR methodology of Campbell and Shiller (1987, 1991). This approach avoids the need to estimate multi-period regressions with overlapping errors. The approach also avoids the shortcomings of the affine term-structure approach, as pointed out by Crump, Eusepi, and Moench (2017), that long-term average expected short rates are nearly constant because of a substantial degree of mean reversion due to the persistence of the latent model factors. Instead, the long-term yield decompositions in this study allow for rolling term premia in order to be consistent with the now widely accepted tenet that bond yields can be decomposed into investors' expectations about the path of future short-term interest rates plus a time-varying term premium. The second contribution of the study is use of average long-term yields that start in the late-1950s, giving more than 55 years of observations to allow for the estimation of regime-switching and probit equations on the largest number of recessions.⁵

The paper proceeds as follows. The following section briefly discusses some recent research on the VAR approach to decomposing long-term yields and on the predictive content of the term premium for output growth. Section 3 outlines the VAR methodology and estimation results for the decomposition of the nominal yields into their theoretical counterparts that are consistent with the expectation theory of the term structure of interest rates and time-varying liquidity premia. Section 4 outlines the linear predictive equation for the term structure models and the estimation results. Regime-switching and probit models and the estimation results are presented in Section 5. The final section briefly discusses some implications of the empirical results for monetary policy and market practitioners.

³ See Clinton (1995) for a useful discussion of the success of the term spread for predicting output growth and inflation in Canada.

⁴ The 90-day commercial paper rate is generally considered to be the short-term interest rate in Canada because at times trading in the 90-day Treasury bill market was considered to be relatively thin.

⁵ In contrast, the sample period in Canada for zero-coupon, constant-maturity bond yields only begins in 1986.

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