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The determinants of corporate bond yields

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Abstract

Previous studies have found that common factors explain a high proportion of corporate bond yields. In this paper, we test whether there is a systematic risk premium beyond that implied by a risk-neutral term structure model. We propose a reduced-form term structure model that incorporates both default and tax effects. After controlling the effects of personal taxes and default risk, empirical tests show that at least two of the Fama–French factors are important for corporate bond yields. Our results suggest that term structure models should incorporate aggregate common risk factors in order to better explain the dynamics of corporate bond yields.

JEL classification: G12

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1. Introduction

Yields of corporate and government bonds differ considerably across rating classes and maturities. In traditional term structure models, yields are determined only by three factors: interest rate, the risk of default, and the expected loss in the event of default. Studies have shown that traditional term structure models cannot fully explain the yields of corporate bonds.[1] In an important paper, Elton et al. (2001) find that default risk explains only a very small proportion of corporate bond

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[1] See, for example, Elton, Gruber, Agrawal, and Mann (2001) and Collin-Dufresne, Goldstein, and Martin (2001).

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yields. For example, the yield due to expected default was found to explain only about 17.8% of the spread for 10-year A-rated industrial bonds. Including state taxes considerably increases the explanatory power of the model. State taxes are found to account for 36.1% of the yield spread for 10-year A-rated bonds, which is substantially larger than the default spread. However, this still leaves a sizable 46.1% of the spread unexplained. Using a model with the Fama–French factors, they find that as much as 85% of the unexplained spread can be construed as compensation for bearing systematic risk. Thus, the Fama–French factors appear to have significant explanatory power for corporate bond spreads.

The findings of Elton et al. (2001) offer two important implications. First, the term structure model should incorporate tax effects in order to provide a more satisfactory explanation for yields. In reality, interest income and capital gains of bonds are both subject to taxes. In addition to federal taxes, returns on corporate bonds are liable to state and local taxes while returns on government bonds are not. Other things being equal, corporate bonds must offer a higher pre-tax yield to give the same after-tax return as government bonds. Thus, taxes should be an important determinant of corporate yields.

Second, there appears to be a systematic risk premium associated with common factors in corporate bond returns. However, it is not clear whether this risk premium reflects the credit risk premium in the risk-neutral default probability of corporate bond. The default spread reported by Elton et al. is the expected default loss calculated from empirical default probability.[2] More specifically, their default probabilities are estimated from a transition probability matrix under the assumption that the transition process is stationary and Markovian.[3] Since the transition probability matrix is constructed from actual default experience complied by either Standard and Poor's or Moody's, the marginal probabilities represent physical probabilities of default. The default spread calculated from these marginal probabilities captures primarily the expected default loss, which involves no risk premium. Therefore, one might argue that the systematic risk premium documented by Elton et al. is simply a proxy for the risk premium under the risk-neutral probability measure.[4]

An important issue here is whether the term structure model can reasonably explain corporate bond yields even if the default premium is properly estimated to be consistent with the risk-neutral probability measure. To address this issue, it is necessary to incorporate taxes into the risk-neutral term structure model instead of using the *ad hoc* model that Elton et al. used. This will separate the problem of tax omission from that of default premium estimation to help identify the real cause of yield underestimation. Using a general term structure model with taxes, we can directly estimate both tax and default premiums under the risk-neutral measure from observed bond prices. We can then determine whether there is a significant systematic risk premium unaccounted for by this risk-neutral after-tax term structure model and if so, whether it can be explained by market-wide common factors.

In this paper we examine if there is an additional risk premium beyond that implied by a risk-neutral after-tax term structure model. We derive a closed-form pricing model of corporate bonds to estimate the risk-neutral default probability directly rather than relying on the rating agency's estimates. Using this model, we jointly estimate both tax and default risk components of corporate bond yields from the term structure model. This approach contrasts with the *ad hoc* approach used by Elton et al. In their study, they estimate the default premium by plugging the

[2] See Elton et al. (2001), Section 2 and Appendix B.

[3] Transition matrices were taken from both Standard and Poor's and Moody's estimates.

[4] By construction, the risk-neutral default probability (Q-measure) contains the default risk premium.