Macroeconomic Conditions, Firm Characteristics, and Credit Spreads

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Abstract We study a structural model that allows us to examine how credit spreads are affected by the interaction between macroeconomic conditions and firm characteristics. Unlike most other structural models, our model explicitly incorporates equilibrium macroeconomic dynamics and models a firm’s cash flow as primitive processes. Corporate securities are priced as contingent claims written on cash flows. Default occurs when the firm’s cash flow cannot cover the interest payments and the recovery rate is dependent on the economic condition at default. Our model produces the following predictions: (i) credit spread is mostly negatively correlated with interest rate; (ii) credit spread yield curves are upward sloping for low-grade bonds; (iii) firm characteristics have significant effects on credit spreads and these effects also vary with economic conditions. These predictions are consistent with the available empirical evidence and generate implications for further empirical investigation.

Keywords Default risk · Macroeconomic conditions · Credit spreads

JEL Classifications G12 · G13 · E43 · E44

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Introduction

This article presents a theoretical framework for risky debt valuation that explicitly incorporates macroeconomic conditions. We model directly a firm’s cash flow process which is embedded in a Lucas-type exchange economy where the growth rate of the aggregate output (i.e., GDP) is mean-reverting. A risky debt written on the firm’s cash flow in this economy is then valued using the contingent claim approach. Our approach provides a direct link between market risk and credit risk and enables us to examine macroeconomic, industry- and firm-specific determinants of credit spread levels and changes. Furthermore, our model allows us to assess the cross-sectional differences in the sensitivity of credit spreads to the changes in macroeconomic conditions.

Valuation of risky debt is central to corporate financing choices and credit investors’ portfolio management. Many models have been proposed for valuing risky debt following the pioneering work of Black and Scholes (1973) and Merton (1974). This structural approach takes as given the dynamics of the risk-free interest rate as well as the dynamics of the asset value of the issuing firm. Default is triggered when the asset value falls below a pre-specified boundary level. Corporate bonds are then valued as contingent claims on the firm’s assets. This is the approach we follow in this paper.

Although conceptually elegant, the structural models have had limited success in matching with empirical data. While there is qualitative evidence supporting the Merton-type models (see, for instance, Sarig and Warga, 1989, Titman and Torous 1989, and Bohn 1999), three empirical puzzles remain. First, the magnitude of credit spreads predicted by theoretical models is inconsistent with historical observations. Jones et al. (1984) and, more recently, Huang and Huang (2003) show that credit spreads predicted by the structural models are significantly below the observed levels, especially for high-grade bonds. In assessing empirical performance of several notable structural models, Eom et al. (2004) find that these models to varying degrees tend to underestimate credit spreads for high quality bonds, but overestimate those for junk debt. Those empirical studies indicate that the accuracy of structural models is a major concern.

Second, the predicted shape of the credit yield spread curve for speculative-grade bonds is at odds with historical observations. Helwege and Turner (1999) document that the yield spread curves for high-yield corporate bonds are upward sloping. This finding contradicts the prediction of humped-shape high-yield credit spread curves from most Merton-type structural models, with the notable exception of Collin-