Credit spread determinants: An 85 year perspective

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Abstract

This paper estimates a set of credit spread forecasting models using an 85 year history for AAA and BAA corporate bond yield data for the US. Credit spreads are defined as the corporate bond yield less the 20 year yield on US government bonds and are explained by a set of intuitively appealing financial and economic variables. Initial results relate to the application of cointegration techniques to provide long and short run estimates of the key determinants of credit spreads. The analysis is then extended to allow for an unobservable latent variable Markov Switching specification across two separate states. Finally a deterministic regime model based upon an inflation threshold is estimated demonstrating that key causal relationships exist independently across different inflationary environments.
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1. Introduction

This paper explains credit spread behavior using a set of intuitively appealing economic variables with a data set that spans a sample period from January 1921 to December 2004 at a monthly frequency. Using Moodys US AAA and BAA interest rate data, I estimate a set of econometric models that seek to explain credit spread movements over the yield of equivalent duration government bonds. This paper is the first in the credit spread literature to consider a data sample that covers such a broad range of business cycle conditions. The sample period covers the depression of the 1930s together with the inflationary cycles

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experienced during the 1970s and early 1980s. In using such an expansive data history I am able to uncover significantly different causal relationships in the key credit spread determinants using recently developed regime switching time series techniques. In doing so the analysis builds upon previous empirical work such as Morris, Neale, and Rolph (1998), Bevan and Garzarelli (2000) and Davies (2004) by conditioning upon alternative inflationary and volatility environments during a significantly extended 85 year data sample.

A key feature of the credit spread literature is the role played by the risk free rate in explaining credit spread behavior. Theoretical credit spread models, as in the spirit of Merton (1974), Longstaff and Schwartz (1995) and Duffee (1998), postulate an inverse relation across the risk free rate and the credit spread. Theoretical models therefore argue that as the risk free rate increases, the corporate rate increases less than proportionately and the credit spread tightens. The empirical literature, such as Morris, Neale, and Rolph (1998) and Bevan and Garzarelli (2000), finds the opposite to be true, with increases in the risk free rate inducing a widening of credit spread rates. One key aim of this paper is to shed further light from an empirical perspective on the role of the risk free rate using the extended 85 year data sample and conditioning upon the prevailing inflationary or volatility environment.

Results presented later show that credit spreads are indeed inversely related to the risk free rate, both in the long and short run. The finding of an inverse long run relation is in contrast to earlier findings of Davies (2004) who uses a shorter data history but supports the empirical work of Morris, Neale, and Rolph (1998) and Bevan and Garzarelli (2000). Furthermore, results demonstrate that the lower credit spread model for BAA bonds is more sensitive to changes in the risk free rate. This finding contradicts the theoretical models of Chance (1990) and Longstaff and Schwartz (1995) who argue that higher grade debt should be more sensitive to changes in the risk free rate. However by isolating a deflationary regime for lower grade debt, I find that BAA spreads are 10 times more sensitive to changes in the risk free rate as compared to a normal or inflationary regime. This result is presumably due to a lack of pricing power on the part of firms during periods of deflation. Such a situation clearly increases the risk of default on lower grade corporate debt and hence induces a greater sensitivity to changes in the risk free rate. By conditioning on the deflationary environment, I find that the remaining normal environment accords with theoretical priors. The credit spread appears to be as sensitive to the risk free rate in the BAA case as it is for higher grade AAA debt.

Other results show that the extension to a two regime latent variable model significantly enhances the explanatory power of the variables considered here. The level and return of the S&P 500 equity index is found to play a significant explanatory role as is the estimated long run equilibrium obtained from a cointegration model across the levels series. The key finding, though, is that conditioning upon the inflationary regime generates meaningful and significant power in explaining subsequent credit spread changes. Furthermore, the inflation threshold differs across high and low grade debt. High grade inflation regimes are triggered at an inflation rate of 4% whereas low grade regimes are triggered at an inflation rate of −1%. This seems reasonable given that the main concern for high grade debt investors is inflation risk, since the risk of default is reasonably low. Alternatively lower grade bond investors, while also concerned with inflation, will primarily be concerned with the risk of default. A deflationary environment is of particular concern to lower grade investors since it implies the absence of pricing power within the economy. That lack of