Insurance Stock Returns Sensitivity to Changes in the Default Spread

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Abstract

Default spreads between corporate bonds and government bonds proxy the systematic risk of default. Using insurance monthly stock returns covering a period from 2000 through 2009, this paper investigates empirically the relationship between insurance company stock returns and default spreads. We find evidence of stock return sensitivity to changes in the default spread. The results are consistent for property- liability and life-health insurance companies.

1. Introduction

In addition to a market factor, insurance stock returns have been shown to be sensitive to changes in interest rates (Fraser et al., 2002, Brewer et al., 2007, Carson et al., 2008, Bouzouita and Young, 2010). Even though a number of studies looked at different aspects of the effect of changes in interest rates on stock prices in terms of measurement and techniques of estimation, little or no attention was given to the effect of default spread on insurance stock returns.

The default spread is commonly used as an indicator of credit market risk premium (Fama and French, 1989, Hahn and Lee, 2006). Default spread is defined as the difference in the yields to maturity of corporate bonds and U.S. Treasury bonds with similar maturity. The default spread is of viable interest to investors for the purpose of hedging and performance attributes and to regulators for an assessment of systematic risk. In the aftermath of the financial crisis of 2008, a sweeping financial reform took place to prevent future financial crisis and to reduce the risks and costs of systematic crises. The Dodd-Frank Act of 2010 established a Federal Insurance Office to monitor insurance companies in all aspects that could lead to an increase in systematic risk to the industry or to the entire financial system.

The contribution of this paper is to investigate the effect of changes in the default credit spread on insurance stock returns. The results of this study will contribute to the understanding of systematic risk of default in the insurance industry. Following Fama and French (1989) we use the spread between BAA corporate bonds and 20 year Treasury bonds as proxy for financial market distress. Using a data set consisting of 132 insurance companies covering the period between 2000 and 2009, we find significant sensitivity between default credit spread and insurance stock returns. Furthermore, we confirm the results for the two segments of the industry.

The reminder of the paper is organized as follows. In the next section we present a brief literature review. In Section 3 we describe the dataset and the methodology used. The results are presented in Section 4. Section 5 concludes.

2. Literature Review

The literature on the effect of interest rate risk on stock returns is vast. Various studies have documented a significant relationship between equity returns and interest rates (Lloyd and

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Shick, 1977, Chance and Lane, 1980, Flannery and James, 1984, Bae, 1990, Elyasiani and Mansur, 1998, 2004, Viale et al., 2009). Some studies incorporate a measure of interest rate risk in the asset valuation process (Stone, 1974, Akela and Greenbaum, 1992). The interest rate risk is measured as either the difference or the level of short term or long term rates. Other studies (Fama and French, 1989, Fama, 1990, Duffee, 2001, Reilly et al., 2007) include a measure of maturity spread defined as the difference between long-term and short term interest rates. Finally, some studies include a measure of default premium defined as the difference between a corporate bond yield and a government bond yield (Chen et al., 1986, Fama and French, 1989, Pontiff and Schall, 1998, Jagannathan and Wang, 1996, Hahn and Lee 2006, Boudoukh et al., 2008). The general finding across these studies is that most of these measures have predictive power in explaining stock returns.

The aim of the majority of these papers was to predict stock returns using interest rate changes and other variations as one of the macroeconomic factors in addition to company specific measures and not to analyze the impact of interest rates risk on stock returns per se. Furthermore, with a few exceptions, the studies that specifically analyze the impact of interest rate on equity returns are industry specific. Flannery and James (1984) find that bank, savings, and loan stock returns are sensitive to interest rates of U.S. government securities and the sensitivity varies according to maturity mismatch between assets and liabilities; Bae (1990) finds a negative interest rate sensitivity that is greater for savings and loans, insurance companies, and commercial banks using a medium-term interest index.

Studies in the insurance industry show that interest rate risk affects stock returns. Using a sample of 60 life insurance companies covering the period from January 1972 through December 2000, Brewer et al. (2007) find evidence that stock returns of life insurance companies are affected by changes in interest rates. Carson et al. (2008) includes three segments of the insurance industry: life, accident and health, and property and casualty and find significant interest rate sensitivity to changes in interest rates in the three segments of the insurance industry. The above studies used a GARCH model to study the impact of interest rate volatility on insurance stock returns. Finally, Bouzouita and Young (2010) investigated the interest rate risk for insurance companies using a balanced panel data covering the period 2000 to 2009. Their results confirm previous studies that find significant impact of changes in short term and long term interest rate changes on insurance stock returns.

3. Methodology

Data

Monthly return data are obtained from the Center for Research in Security Prices (CRSP) database. The sample period is January 2000 through December 2009. Our sample only includes insurance companies with available data. We select insurance companies according to their SIC code: 6311 (Life insurance, 34 companies), 6321 (Accident & Health, 24 companies), and 6331 (Property & Casualty, 74 companies) excluding reinsurance companies. Our final sample consists of 132 companies.

We use three series of interest rates in this study: short-term default-free rates measured by U.S. Treasury bills, long-term default-free rates measured by U.S. Treasury Bonds, and long-term corporate bonds which are exposed to default risk. The long-term U.S. Treasury return is the yield on 20-year government bonds constant maturity. The short-term U.S. Treasury bill rate is the 3-month constant maturity U.S Treasury rate. The long-term corporate rate is the BAA corporate bond rate. All three rates are from FRED II database from the Federal Reserve Bank of St Louis website.

The focus of our analysis is the sensitivity of insurance stock returns to changes in the default spread. The spread between the BAA corporate bond rate and the 20 year U.S. Treasury bond rate is used as measure of the default risk premium. We also employed an alternative measure of default spread, measured as the difference between BAA and AAA corporate bonds. This alternative definition did not alter our main findings. We also include a measure for the term spread defined as the spread between the 20 year and the 3-month U.S. Treasury rates.
Finally, in order to test whether the results are sensitive to the choice of a proxy for the market index we use two measures of market returns: the CRSP value weighted total returns, which is labeled as CRSP, and the S&P 500 index, which is labeled as SP500. Both series are obtained from the CRSP database.

We use the augmented Dickey-Fuller (Dickey and Fuller, 1979) and Phillips Perron (Phillips and Perron, 1988) tests to check for stationarity for the variables of interest. We find that the short term interest rate, maturity and default spread follow an I(1) process, but their first differences follow an I(0) process. Given the panel nature of our dataset, we also employ the Maddala and Wu unit root test (Maddala and Wu, 1999). The test indicates that returns follow an I(0) process and confirms our findings for the short term interest rate, maturity, and default spread.

Summary statistics for our sample are presented in Table 1.

Estimation

Extending the model in Flannery and James (1984), we estimate the following model:

$$R_{i,t} = \alpha + \beta_m R_{m,t} + \beta_{RF} \Delta RF_t + \beta_{MAT} \Delta MATURITY_t + \beta_{DEF} \Delta DEFAULT_t + \varepsilon_{i,t}$$

where α, β_m, β_{RF}, β_{MAT}, and β_{DEF} are the parameters to be estimated, $R_{i,t}$ is the return of insurance company i at time t (last trading day of each month), $R_{m,t}$ is the market index at time t (last trading day of each month), ΔRF_{it} is the change (first difference) in the 3 month U.S. Treasury Bills, $\Delta MATURITY_{it}$ is the change (first difference) in the term spread, $\Delta DEFAULT_{it}$ is the change (first difference) in the default spread, and $\varepsilon_{i,t}$ represents the random error term.

Given that stock returns and risks for the insurance companies are probably interrelated, we allow for serial correlation in the estimation procedure. The null hypothesis of no autocorrelation is rejected. We choose a first-order autoregressive specification for the error term.

4. Results

Table 1 presents summary statistics for our sample. Over the time period covered, the average return of insurance stocks was slightly over one percent (1.03%) while the average return of the CRSP value weighted is 0.14 %. It seems that insurance stocks performed better than the market index measured by CRSP and even better performance compared to S&P 500 which registered a negative return over sample period. On the other hand, we notice that insurance stock returns exhibit a higher risk, measured by the standard deviation, than either market returns. The interest rate measures show that the short term interest rate declined, and both the maturity spread and the default spread increased over the time period. Table 2 reports the partial correlation among independent variables. The correlation matrix reveals no strong correlation between the variables. The two proxies for market returns, as expected, are highly correlated but these measures are not included in the same model.

Results of our analysis are shown in Table 3. We find the coefficient of our measure of default spread to be negative and significant in all models. This implies that an increase in the default spread is associated with worsening business conditions which results in a decrease in the return on insurance stocks. This result holds while controlling for the market effect, the change in short term interest rate, and the change in the maturity spread. We get similar results by using either the CRSP value weighted total returns or the S&P 500 total returns.

Table 4 reports the results by industry. The industry results are in line with the results for the entire industry presented in Table 3. The magnitude of the market beta is higher for life and health insurance companies than for property liability companies irrespective of the measure of market index used. Similar results have been reported by previous studies (Brewer et al., 2007, Carson et al., 2008) which use data covering periods that end at the beginning of our sample period. The systematic risk of the insurance stock has been stable. Life insurance companies exhibiting higher systematic risk than property liability companies may be explained by two factors that affect beta which are size and leverage. Life insurance companies tend to be larger in terms of assets and more leveraged than property and liability companies. The effect of size and leverage on market beta has been widely reported in the financial literature (Brealy and Myers, 2000).

5. Conclusion

In this paper we investigate empirically the sensitivity of insurance stock returns to changes in the default spread. Although previous studies looked at the relationship between default spreads and stock returns, this relationship has not been addressed in the context of insurance companies. The relationship of insurance stock returns to changes in default spreads is uncertain because insurance firms are regulated in order to reduce the default risk for their policies. Using monthly return data over a period of 10 years, we find evidence of a negative relationship between insurance stock returns and changes in the default spread. These results are consistent within the life and health and property and liability segments of the industry.

The implication of our result is that, despite the publication of default risk ratings by A.M. Best Company and intensive state regulation, default risk is still a problem for

stockholders. Insurance companies are advised to aggressively engage in risk management practices that would mitigate the interest rate risk to shareholders. Also, the results will further our understanding of factors that affect insurance stock returns.

Table 1 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Insurance Company Return	15840	0.0103	0.1277	-0.8348	2.4498
CRSP Value Weighted	15840	0.0014	0.0489	-0.1847	0.1094
S&P 500	15840	-0.0012	0.0463	-0.1694	0.0967
ΔRF	15840	-0.0453	0.2415	-0.8900	0.4500
ΔMATURITY	15840	0.0252	0.2917	-0.9300	0.8600
ΔDEFAULT	15840	0.0039	0.2215	-0.8500	1.4400

Table 2 Partial Correlations

Variable	CRSP	S&P 500	ΔRF	ΔMATURITY	ΔDEFAULT
CRSP	1.000				
S&P 500	0.9787	1.000			
ΔRF	0.1695	0.1508	1.0000		
ΔMATURITY	-0.1175	-0.09	-0.698	1.0000	
ΔDEFAULT	-0.3383	-0.2981	-0.3172	0.0125	1.000

Table 3 Panel Data Results, N= 132 Companies, T= 120 Monthly Returns

Variable	Coef.	Std. Err.	p-val
Panel A: Model using CRSP Value Weighted Total Returns			
Market Return	0.5810	0.0215	0.0000
ΔRF	-0.0339	0.0062	0.0000
ΔMATURITY	-0.0373	0.0050	0.0000
ΔDEFAULT	-0.0203	0.0051	0.0000
Intercept	0.0090	0.0010	0.0000
Panel B: Model using S&P500			
Market Return	0.6240	0.0222	0.0000
ΔRF	-0.0373	0.0062	0.0000
ΔMATURITY	-0.0415	0.0049	0.0000
ΔDEFAULT	-0.0259	0.0050	0.0000
Intercept	0.0105	0.0010	0.0000

Table 4 Results by Industry

	Life & Health Insurers			**Property & Liability Insurers**		
Variable	Coef.	Std. Err.	p-val	Coef.	Std. Err.	p-val
Panel A: Model using CRSP Value Weighted Total Returns						
Market Return	0.7351	0.0365	0.0000	0.4607	0.0254	0.0000
ΔRF	-0.0314	0.0107	0.0030	-0.0359	0.0074	0.0000
ΔMATURITY	-0.0403	0.0084	0.0000	-0.0352	0.0059	0.0000
ΔDEFAULT	-0.0185	0.0087	0.0350	-0.0214	0.0060	0.0000
Intercept	0.0114	0.0017	0.0000	0.0070	0.0011	0.0000
Panel B: Model using S&P500						
Market Return	0.7808	0.0378	0.0000	0.5014	0.0263	0.0000
ΔRF	-0.0359	0.0106	0.0010	-0.0386	0.0073	0.0000
ΔMATURITY	-0.0459	0.0084	0.0000	-0.0384	0.0058	0.0000
ΔDEFAULT	-0.0262	0.0086	0.0020	-0.0254	0.0059	0.0000
Intercept	0.0134	0.0017	0.0000	0.0082	0.0011	0.0000

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