

The Impact of Macroeconomic Conditions on Credit Risk

Masterarbeit

in

Corporate Finance

am

**Institut für Banking und Finance
Universität Zürich**

bei

PROF. DR. ALEXANDER WAGNER

Verfasser: REBEKKA RÜEGG

Abgabedatum: 02. April 2012

Executive Summary

One decade ago, corporate credit risk was essentially untradeable. In the meantime, credit derivative innovations have gained in importance in the financial markets. The credit derivative market has been soaring thanks to a rich range of innovations. To a major extent, this growth has been driven by the demand of both banks and investors to hedge and lay off their credit exposures. Due to the financial crisis, which was predominately driven by the illiquidity of credit derivative products according to Tang and Yan (2008a), the contractant risk has become of interest and in general, the demand for credit protection instruments has experienced another boost. In addition to obviously increasing importance, the identification and accordingly, the examination of the various determinants of credit risk has become of great interest. Economic intuition suggests that cycles of the economy should have a significant impact on the likelihood of a default. However, it is questioned whether the general business climate or company-specific characteristics for instance are the main driver of credit risk. Worsening economic conditions – namely macroeconomic or systemic risk – raise cost of corporate debt as companies are more likely to default and operations are usually negatively affected. As a matter of fact, the overall state of economy and changes of the business climate have a determining impact on credit risk. The central aspect developed in this thesis is that credit risk is linked inherently to the overall state of economy and to changes in business climate.

Problem Definition

Purpose and objective of this thesis is to provide in a first step a better understanding how macroeconomic conditions affect credit risk by examining both the role of the overall state of economy and changes in business climate. It is followed by the identification of an accurate set of macroeconomic factors, recognized as determining factors for credit risk. The idea that credit risk of companies in diverse industries is affected by company-specific characteristics and macroeconomic conditions to different extents is also investigated. Firstly, a reliable proxy for credit risk needs to be defined. Due to their characterization as credit protection instruments, Credit Default Swaps (CDS) are considered a measure of the creditworthiness of bond issuers. Consequently, CDS spreads are an appropriate way to reflect the occurrence of credit risk. In a next step, adequate variables for company-specific characteristics and proxies for macroeconomic conditions need to be identified and applied to the model. To do so, theoretical determinants of credit risk, that may be relevant in explaining credit risk and movements in credit risk of companies, are selected in the spirit of past researchers.

Methodology

The focus of this thesis is on listed US companies for which traded CDS are available for the period from early 2003 to December 2011. All companies included in the data sample have been members of the S&P 500 Index for the entire period of investigation. All in all, a final sample comprising 140 companies of nine different business sectors is examined. In order to analyse the determinants of credit risk and especially to examine the impact of macroeconomic conditions – the variables of main interest –, company-specific and macroeconomic data are considered for the regression analysis. Several panel data regressions using various determinants are employed to test the research hypotheses. Therefore, variables like the CDS price, Amihud illiquidity measure, financial leverage, historical implied call volatility, equity rating recommendation, sales per share, 10-year US generic government bond yield, and US unemployment rate are included in the regression analysis. By applying an alternative set of variables, other proxies for the overall state of economy, the appropriateness and the findings of the first regression model are tested.

Initially, the focus is on a fixed-effects regression analysis using level data including only absolute and relative data of the relevant variables. This approach allows figuring out to what extent company-specific factors affect CDS prices – the proxy for credit risk – but also if macroeconomic conditions play a key role in explaining credit risk. The results also show if the impact of business climate as such and changes to business climate on credit risk are significant. In a second step, the appropriateness of the macroeconomic variables, applied in the first model, is tested employing several fixed-effects regression analyses using an alternative set of macroeconomic variables. Albeit selected carefully, the applied macroeconomic variables may not perfectly capture the predicted effect on CDS prices. As a consequence, the 2-year US generic government bond yield, slope of the yield curve and consumer confidence sentiment are included as alternative proxies for the overall state of economy. This approach is the first of three robustness checks of the principal regression model through which the accurateness of the examined determinants of credit risk is tested. A second robustness check with respect to the methodology of the fixed-effects model is employed. Doing so, instead of a fixed-effects model, a random-effects model is applied for the regression analysis of selective industry sectors. The third and last robustness check is the estimation of the principal fixed-effects model with a shortened period – January 2007 through December 2011. It does not only test the results of the previous regression analyses but also and more importantly potential effects of macroeconomic tendencies – such as the financial crisis – on CDS prices.

Results

The results of the first regression analysis report that the variables suggested by theory are mostly significant both statistically and economically in explaining variations of individual firms' CDS prices. The findings attest historical implied call volatility and financial leverage a high determining induction and both affect CDS spreads positively. The equity rating recommendation, highly determining as well, has a significant negative influence on CDS prices. The 10-year US generic government bond yield accounts for a significant and large negative impact on CDS prices. Thus, a decreasing risk-free rate has a positive effect on CDS prices since credit risk is expected to increase due to a worsening of the economic condition. Additionally, the unemployment rate, a good proxy for the overall state of economy, confirms a positive impact. Therefore, the main variables of investigation, risk-free interest rate and unemployment rate as proxy for the overall state of economy, induce a negative and positive effect on CDS prices, respectively. So, the worse the economic condition, the higher are CDS prices and thus, the higher is credit risk. Unlike historical implied call volatility and financial leverage, the determining power of the 10-year risk-free interest rate and the unemployment rate on CDS prices is only moderate. Nevertheless, since both macroeconomic variables have a highly significant impact on the CDS level, they are still considered relevant determinants of credit risk. The findings also imply that the degree of impact by company-specific factors and macroeconomic conditions on companies' credit risk varies by industry sector. However, the estimated beta coefficients of the applied variables report not huge but moderate differences with respect to the various industry sectors.

In general, the regression analyses applying a new set of macroeconomic variables are in most instances consistent with the findings provided by the principal regression model. Moreover, the new variables accounting for the overall state of economy confirm a negative and highly significant impact on credit risk. Thus, these alternative variables generally agree with economic intuition that a rise in the overall business climate lowers credit risk. Summing up, as the results of the effects of the first regression model remain robust to the inclusion of a number of new macroeconomic variables, confidence in the estimates and the employed regression model is inspired. The findings of the robustness check – testing the appropriateness of the employed regression model – indicate that the results of the random-effects regression analyses support the findings of the fixed-effects model. Therefore, the results of the principal model remain robust as well, which implies confidence in the choice of the fixed-effects model. The results of the robustness test applying a shortened time span are in line with evidence provided by the prior regression analyses. Additionally, the 10-year risk-

free interest rate affects CDS prices to an even stronger negative extent during the shortened period whereas the determining power of the financial leverage and the historical implied call volatility is slightly lower. This finding provides evidence that the overall state of economy plays an important role in explaining credit risk particularly during an economic crisis.

General View

The fixed-effects regression model using a rich set of company-specific and macroeconomic data documents a highly significant impact of several macroeconomic variables on credit risk. These variables include 2-year and 10-year risk-free interest rate, slope of the yield curve, unemployment rate, and consumer confidence sentiment. Moreover, this thesis shows that CDS prices, and thus credit risk, are inversely related to the overall state of economy such as business climate. In addition, the 10-year risk-free rate is found to have an even stronger negative impact on credit risk during the period of financial crisis. To conclude, the findings provide strong empirical evidence of the importance of macroeconomic conditions and variations in business climate on credit risk of companies. This should not be ignored in credit risk management and economic policy.

A shortcoming of the employed regression analysis is that the investigated data sample is rather small. Thus, incorporating a larger set of companies is expected to improve the performance of the regression models and to deliver more significant results. In a further work, it is of great interest to investigate additional company-specific variables and proxies for the overall state of economy and changes in business climate to test the effects of alternative variables on credit risk. To advance the performance of credit risk models, investigation could be pursued, by incorporating of macroeconomic uncertainty.