

Credit Ratings and the Issue Price of Structured Products

Bachelor Thesis in Banking and Finance

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Executive Summary

Problem

Investors buy structured products to participate on a certain underlying and additionally benefit from capital protection, coupon payments (even if the underlying is a stock) or superior participation. Further, it allows investors to participate on otherwise difficult tradeable underlyings or invest in inaccessible markets. The products' arrangers have an economic incentive to increase the issue price and/or decrease the fair value of such products since they directly earn the difference between both. With the bankruptcy of Lehman Brothers in 2008 investors painfully realized that structured products are no special asset class and the default risk of the issuer must consequently be tolerated. This paper analyses the influence of such default risk and focuses on the question whether issuers compensated investors for their inherent credit risk or whether they did not, especially before and after the collapse of Lehman Brothers.

Method

Based on the work of Woschitz (2010) we use a relative measurement approach to evaluate the fair pricing of structured products at issuance. We divide the difference of the initial price and the theoretical risk free fair value of structured products by their issue price and receive a ratio that we name *fair value gap*.

The required data stems from a historical database of structured products quoted at the Scoach Schweiz AG exchange and is provided by Derivative Partners Group. We further use the Daily Aggregated Market Data Eurex, provided by Deutsche Börse Group. Theoretical risk free fair values are calculated by replicating the structured products with bond and option components since we assume that the put-call parity holds. Implied volatilities from four options, which enclose the option embedded in the structured product, are extracted from the Eurex database using the Black-Scholes model. We then use the results to calculate a theoretical market price of the options which are included in the replication portfolio. Finally, fair value gaps are computed according to the structured product's issue price.

To evaluate the relationship between fair value gaps and credit risk, we use credit ratings from Standard & Poor's, Moody's and Fitch and assign historical default probabilities to these ratings. Historical credit ratings stem from Reuters and historical default probabilities are derived from annually published reports by credit rating agencies. We use OLS regressions to test the expected influence and include further variables to control for the issuer, time and product classes and general indicators of market environment, market concentration and credit risk. In the first approach, historical default probabilities are assigned to the rating of every issuer at every structured product's issuance. We then analyse the influence on fair value gaps. In a second step, we directly examine the current rating at the date of issuance.

Results

In general, our hypotheses suggest that issuers compensate investors for their inherent credit risk by either lower prices at issuance or by constructing more valuable products. Moreover,

we assume that this was not the case before the bankruptcy of Lehman Brothers on September 15, 2008. But with the raised awareness of issuers towards this risk, banks should have begun to compensate thereafter. We assume that if compensation occurred, we should find a *negative* relationship between historical default probabilities and fair value gaps and *positive* coefficients, if we use ratings instead of default probabilities.

We find that, according to both S&P long-term issuer and long-term debt ratings, investors were compensated after the default of Lehman Brothers. For the same subsample we cannot confirm the findings using ratings from Moody's and Fitch. We also detect indication that investors were not compensated in general for all ratings except of Fitch long-term debt ratings.

In a second step we replace historical default probabilities as risk measure with letter grade ratings from Standard & Poor's, Moody's and Fitch. We test for the linear influence when ratings are assigned to numbers as well as for indicator relations, which compare each rating category to a base rating. The results do neither indicate any compensation for the full sample nor for the pre September 2008 subsample. Investors were therefore not compensated. However, the subsample after September 2008 indicates the exact opposite from the previous findings. We expect higher and therefore better ratings to go along with higher fair value gaps because relatively save issuers should not have to compensate investors. Interestingly, the negative coefficients signify that issuers with worse ratings do not only not compensate investors for higher credit risk, but even seem to overprice structured products more. Lower ratings allow banks to offer more attractive conditions, as for example higher coupon payments or superior participation. Even though, such issuers price their product in the disfavour of investors and earn the difference between the product's issue price and its fair value. We can think of a possible explanation, namely that issuers use structured products as cheap source for refinancing when their required interest on debt increases with lower solvency.

Evaluation

This study partially confirms the suggestion that issuing banks compensate investors for higher inherent credit risk. However, a compensation only occurred after the collapse of Lehman Brothers. Since many investors lost their investments in structured products due to Lehman's default, the raising awareness of the investors obliged banks to compensate for such risks. However, if we change the measure of risk to letter ratings, we have to reject our suggestions. The results indicate a significantly negative influence of ratings on structured products' fair value gaps, which is the opposite of our assumed compensation. It is not quite clear whether the results from historical default probabilities or letter ratings are true. We suppose the latter since historical default probabilities show inconsistencies due to historical distortions. Usually we would assume that the default probability increases with longer maturity and lower rating, which was not always the case. Furthermore, the default probabilities also seem to be inconsistent among credit rating agencies.