The Low-Risk Anomaly in Credits

By Robeco Quantitative Strategies & Robeco Fixed Income Investments

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In this Research Note we show that low-risk credits had superior risk-adjusted excess returns over the past 20 years.[1] By selecting low-risk bonds from low-risk issuers, investors would have earned credit-like returns at substantially lower risk. This low-risk anomaly strongly resembles the low-risk anomaly in equity markets that was documented in earlier Robeco research and forms the basis of the Robeco Conservative Equity product line.

Below we present our research on the low-risk anomaly in credit markets using various dimensions of risk. We also provide explanations why we believe that the anomaly is likely to persist in the future. We conclude with a brief description of the Robeco Conservative Credits strategy, which exploits the low-risk anomaly by investing in bonds with a below-average maturity from issuers with below-average risk. This category of credits should appeal to long-term investors that want to realize superior risk-adjusted excess returns through the cycle.

The Low-Risk Anomaly in Equity Markets

Traditional financial theory states that higher risk should be rewarded with higher returns. However, academic research has shown that low-beta stocks had higher risk-adjusted returns. This low-beta effect is actually one of the oldest anomalies, proven for US markets in the 1970s.[2] Furthermore, award-winning research by Robeco[3] confirms the low-beta effect for other markets and documents a related low-volatility effect: low-volatility stocks earned higher Sharpe ratios. These low-beta and low-volatility effects are the cornerstones of Robeco's Conservative Equity products, which have been successful since their launch in 2006.

Explanations for the Low-Risk Anomaly

We believe that investors are biased towards, and willing to overpay, for high-risk stocks and bonds. This causes a low-risk anomaly: low-risk securities empirically had a superior risk-return profile compared with high-risk securities. Furthermore, we believe that this low-risk anomaly is likely to persist in the future, because of two reasons: (1) benchmarked investing, in combination

[1] Throughout this note, we use credits' excess returns over duration-matched Treasury bonds, thus ignoring the impact of changes in Treasury bond yields and only focusing on the impact of changes in credit spreads. In actual portfolios, the interest rate exposure can be separately managed, e.g. in relation to the duration profile of the client's liabilities.

[2] See, amongst others, Black, Jensen & Scholes (1972, "The Capital Asset Pricing Model: Some Empirical Tests", *Studies in the Theory of Capital Markets*) and Haugen (1996, "Commonality in the Determinants of Expected Stock Returns", *Journal of Financial Economics*)

[3] See Blitz & Van Vliet (2007, "The Volatility Effect", *Journal of Portfolio Management*)

with (2) market segmentation. The second reason is specific to bond markets, whereas the first reason equally applies to equity markets.[4]

Many portfolio managers of outsourced investment mandates are incentivized to outperform a specified benchmark index. Since low-risk credits have large tracking error volatility relative to that index, and are perceived to have a lower expected return, they are considered unattractive investment opportunities. The opposite holds for high-risk credits: their tracking error volatility is expected to be rewarded with outperformance relative to the index. Therefore, investors have a preference for high-risk credits, and are therefore overpaying for them.[5] This effect is amplified by a 'hot money' effect: money flows to well-performing assets classes, in which outperforming portfolio managers receive the largest inflows. This provides another incentive for portfolio managers to buy high-risk credits, because they tend to outperform in bull markets.

Due to the existing segmentation of the bond market into Treasury bonds, investment grade credits and high yield credits, the low-risk anomaly exists separately in these market segments.[6] Investors in government bonds are generally unwilling or unable to shift their holdings to low-risk investment grade credits, despite their more attractive risk-return profile. Likewise, investors in investment grade credits are often not allowed to buy low-risk high yield bonds.

Dimensions of Risk

Risk has many dimensions, both on the bond level and on the issuer level. We consider the following dimensions:

- **Maturity**: shorter-maturity bonds are less volatile than longer-maturity bonds;
- **Distress risk**: bonds of companies with less financial distress risk are less volatile than bonds of more distressed companies;
- **Seniority**: bonds that are more senior in the capital structure are less volatile than more subordinated bonds.

These dimensions are linked to the factors of the Robeco Credit Risk model[7], where the excess return volatility of a corporate bond depends on its spread-duration and its credit spread. The maturity dimension corresponds to the duration-factor in our risk model, while the distress risk and seniority dimensions correspond to the spread-factor. Whereas maturity and seniority are easily measurable characteristics of a bond, the measurement of distress risk deserves more attention. Based on extensive research, we developed the Robeco Distress Risk model, which is a powerful indicator of future financial distress. The model relies on concepts developed in the academic literature on predicting default risk.[8] The model takes into account how balance sheet leverage might translate into future distress and incorporates information from the firm's equity as well. We refer the interested reader to a separate Research Note on this topic.[9]

[4] See also Blitz & Van Vliet (2007) for a more elaborate description of these and other explanations.

[5] See Becker & Ivashina (2012, "Reaching for Yield in the Corporate Bond Market", working paper Harvard University) for evidence of risk-seeking behavior by insurance companies.

[6] Treasury bonds are outside the scope of this research, but shorter-duration Treasury bonds (i.e. low-volatility Treasuries) have indeed historically outperformed longer-duration bonds on a risk-adjusted basis. See e.g. Ilmanen, Byrne, Gunasekera & Minikin (2004, "Which Risks Have Been Best Rewarded?", Journal of Portfolio Management)

[7] See Ben Dor, Dynkin, Hyman, Houweling, Van Leeuwen & Penninga (2007, "Duration Times Spread: A New Measure of Spread Exposure in Credit Portfolios", *Journal of Portfolio Management*)

[8] See Merton (1974, "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates", *Journal of Finance*)

[9] See Huij, van Vliet, Zhou & De Groot (2012, "How Distress Risk Improves Low Volatility Strategies: Lessons Learned

Research Findings

Next we document our empirical research on the low-risk anomaly in credits. The research is conducted using our proprietary corporate bond database, which contains historical returns and characteristics of all constituents of the Barclays Capital U.S. Investment Grade and High Yield indices over the period from October 1988 to September 2011.[10] This data base is quite unique in terms of breadth of bonds and length of its history and not many others have access to it. This may also may the reason why credit markets are relatively under-researched in the academic literature.

In our research, we construct portfolios of bonds with similar risk characteristics in every month. We hold each portfolio for 12 months. Redemptions, coupons, downgrades, upgrades and defaults are all taken into account in calculating the portfolio's return. We calculate each portfolio's return in excess over duration-matched US Treasury bonds.

Below we provide empirical evidence on the existence of the low-risk anomaly for each of the three risk dimensions: maturity, distress risk and seniority.

Maturity Effect

We start with a description of our findings on the maturity effect. In fact, we already documented this effect in earlier research.[11] There is some further academic evidence on this topic by Ilmanen and co-authors.[12]

We use the following procedure to construct portfolios. Every month we sort the available bonds on their remaining time to maturity and create five quintile portfolios: the first portfolio contains the 20% of the bonds with the shortest maturities, the second portfolio contains the next 20%, et cetera, until the fifth portfolio that contains the 20% longest maturities. For each portfolio we calculate the excess return as described above.

Figure 1 plots the volatility of the excess returns versus their average over the entire research period, as well as over a sub-period that ends in June 2007, thus excluding the turbulent recent years of the subprime crisis and the EMU debt crisis. The graphs clearly show that longer-maturity bonds not only had a higher excess return volatility (as expected), but also a lower excess return. This contradicts the traditional textbook paradigm that higher risk should be rewarded with higher returns. Rather, it provides evidence for the existence of a low-risk anomaly, which states that investors overpay for high-risk credits. This observed pattern is not caused by the recent volatile years, as shown in the second graph of Figure 1: exclusion of the period 2007-2011 merely shifts all observations to the upper-left corner, but does not change the downward-

Since 2006", Robeco Research Note)

[10] We use USD indices for our main analyses, because they are available over a much longer period than euro data. Results for euro investment grade credits are shown in the Appendix. These results are supportive of the low-risk anomaly and improve our confidence in its robustness. The number of euro high yield bonds is too low to create sufficiently diversified single-sort and double-sort portfolios.

[11] See Haesen, Houweling & Bus (2009, "Exploiting the Short-Maturity Effect in Corporate Bonds", Robeco Research Note) and Derwall, Huij & de Zwart (2009, "The Short-Term Corporate Bond Anomaly", working paper Erasmus University)

[12] See Ilmanen, Byrne, Gunasekera & Minikin (2004, "Which Risks Have Been Best Rewarded?", *Journal of Portfolio Management*) and Ilmanen (2010, "Expected Returns: An Investor's Guide to Harvesting Market Rewards", Wiley)

sloping nature of the risk-return relationship. Figure 4 in the appendix shows the same downward-sloping patterns for US high yield and EU investment grade bonds.

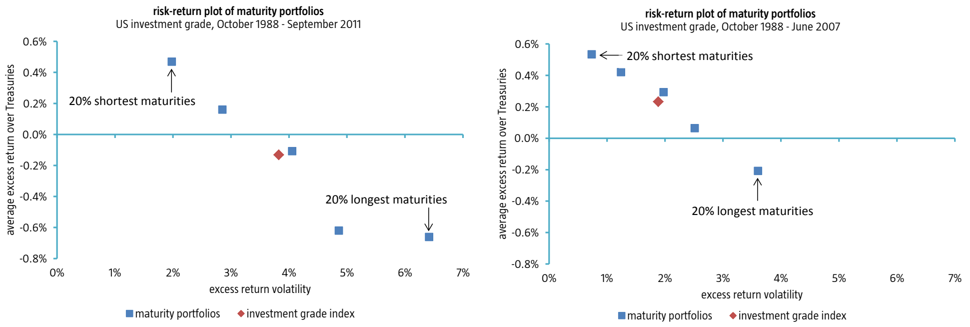

Figure 1 Average and volatility of excess returns of maturity quintile portfolios and of the index for USD investment grade credits from October 1988 to September 2011 (left graph) and to June 2007 (right graph). Sources: Barclays Capital, Robeco Quantitative Strategies.

Distress Risk Effect

Next we turn to analyzing the effect of distress risk on the risk-return relationship. There is little academic evidence for corporate bonds on this topic. [13] For equity markets, however, there are some recent publications showing that financially distressed stocks have anomalously low returns.[14]

We follow a similar procedure as above for the maturity effect by creating quintile portfolios based on our Distress Risk model.[15] Five distress risk portfolios are created *within* each maturity portfolio, so that in total we have 25 portfolios. We use this double-sort approach in order to show the *additional* effect of distress risk on top of the maturity effect. Moreover, in this way we control for a quality bias in bond issuance: companies of higher credit quality are able to issue longer-term bonds.

Figure 2 plots the five distress risk sub-portfolios within the first maturity portfolio. We find that the risk-return relationship is basically flat: bonds of companies with higher distress risk had higher excess return volatilities, but not higher excess returns. Especially the sub-portfolio filled with the 20% most risky companies stands out due to its much higher volatility. These findings are robust to the exclusion of the volatile 2007-2011 period in the second graph in Figure 2: this mainly compresses the volatilities on the x-axis. Just like with the maturity effect, our results contradict traditional finance theory, but support the low-risk anomaly.

Figure 5 and Figure 6 in the appendix show the results for other maturity segments, for USD high yield and for EUR investment grade. All graphs show a risk-return relationship that is either flat or too flat, i.e. either additional distress risk was not rewarded at all or it was not sufficiently

[13] See the references in footnote 12 and Frazzini & Pedersen (2011, "Betting Against Beta", working paper New York University) and Falkenstein (2011, "Risk and Return in General", working paper). However, all studies use ratings to measure distress risk, which indeed reduce volatility, but also unnecessarily reduce returns.

[14] See Campbell, Hilscher & Szilagy (2008, "In Search of Distress Risk", *Journal of Finance*) and De Groot & Huij (2011, "Is the Value Premium Really a Compensation for Distress Risk?", working paper Erasmus University)

[15] To ensure a proper diversification in each of the 25 maturity x distress risk portfolios, the start date of this analysis is January 1994.

rewarded with higher returns. In all cases, bonds of short-maturity issued by low-distress risk companies had the best risk-return profile.

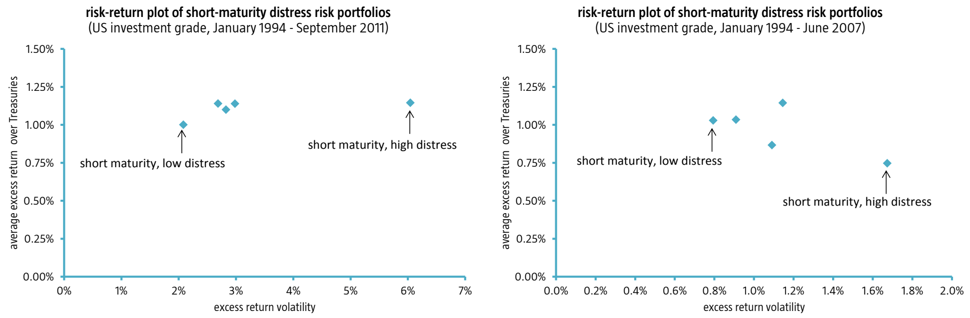

Figure 2 Average and volatility of excess returns of distress risk quintile portfolios within the first short-maturity quintile portfolio for USD investment grade credits from January 1994 to September 2011 (left graph) and to June 2007 (right graph). Sources: Barclays Capital, FactSet, Robeco Quantitative Strategies.

Seniority Effect

Finally, we look at the third dimension of risk: the seniority of a bond in a firm's capital structure. Here, we focus on banks, because they frequently issue bonds with different seniorities, such as senior and subordinated bonds. Unfortunately, the data only start in 2003 and the seniority portfolios are not maturity-specific, so we should give less weight to these results than the ones presented above.

Figure 3 depicts the risk-return relationship, both over the full sample and until the start of the subprime crisis in 2007. In both cases we find that Tier I-bonds had a much higher volatility, as expected. For the period 2003-2011, Tier I-bonds had a negative return, strongly underperforming Senior and Lower Tier-II bonds. For the period until June 2007, Tier I-bonds did have a larger return, but not sufficiently large to compensate for their higher risk. So, their Sharpe ratio was lower than that of Senior and Lower Tier-II bonds. These results are supportive of the low-risk anomaly, because they show that investors overpaid for high-risk securities (Tier I-bonds in this case). Figure 7 in the appendix confirms this finding for euro investment grade banking bonds.

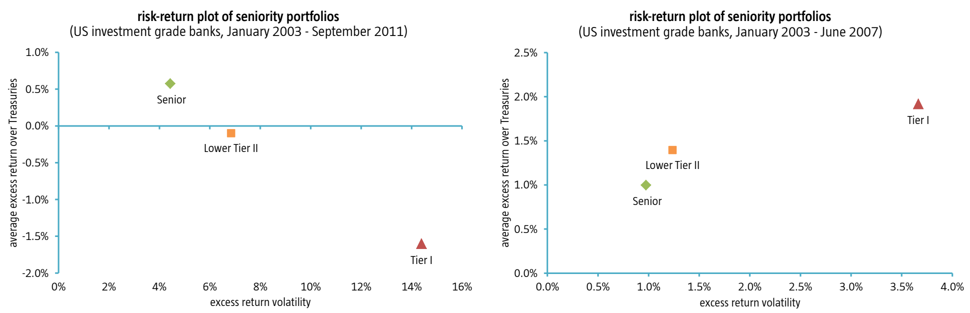

Figure 3 Average and volatility of excess returns of seniority portfolios for USD investment grade banks from January 2003 to September 2011 (left graph) and to June 2007 (right graph). Sources: Barclays Capital, Robeco Quantitative Strategies.

Robeco Conservative Credits

We conclude this Research Note with a brief description of the Robeco Conservative Credits strategy.[16] The main driver of the strategy is the exploitation of the low-risk anomaly. The strategy implements the findings of the research described above in a disciplined investment process that starts with the investment universe and ends in the model portfolio. The process consists of the following steps:

- **Universe:** We start with a combined investment grade plus high yield universe of corporates, agencies and supranationals.
- **Bond screening:** We then exclude bonds that do not qualify as low-risk, i.e. bonds with an above-average legal maturity, bonds with a rating below BB, bonds from financials with seniority below Lower Tier II and subordinated bonds from non-financials. Callable bonds are also excluded to prevent undesired maturity-extension.
- **Quantitative ranking:** The next step is to rank the remaining credits using our quantitative model, which is constructed to capture the low distress risk anomaly. To select low-risk bonds with an attractive upside potential, the model is augmented with valuation and sentiment factors. Credits that rank in the top 50% of the model are eligible for inclusion in the model portfolio.
- **Fundamental screening:** In order to mitigate non-quantifiable downside risks, the eligible credits are analyzed by our team of experienced credit analysts. Examples of such risks include weak bond indentures, missing guarantees, weak corporate governance and ESG risks.
- **Portfolio construction:** The final step is to construct a model portfolio, taking into account bond liquidity and diversification across names, sectors, regions and maturities. Sell rules are used to further reduce downside risks, while keeping turnover low.

Our research shows that such a strategy would have delivered credit-like returns with a substantially lower risk. This should appeal to long-term investors, such as pension funds and insurance companies. Moreover, the latter have to hold less regulatory capital for Robeco Conservative Credits than for a regular investment grade portfolio, because the new Solvency II framework favors shorter-dated and higher-rated bonds.

[16] A full description is beyond the scope of this note. We invite the reader to contact their Robeco account manager or sales representative in order to arrange a meeting on this strategy.

APPENDIX

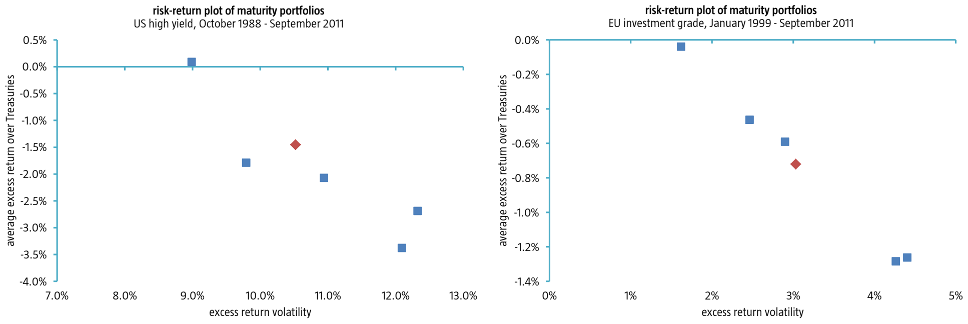

Figure 4 Average and volatility of excess returns of maturity quintile portfolios and of the index for USD high yield credits from October 1988 to September 2011 (left graph) and for EUR investment grade credits from January 1999 to September 2011 (right graph). Sources: Barclays Capital, Robeco Quantitative Strategies.

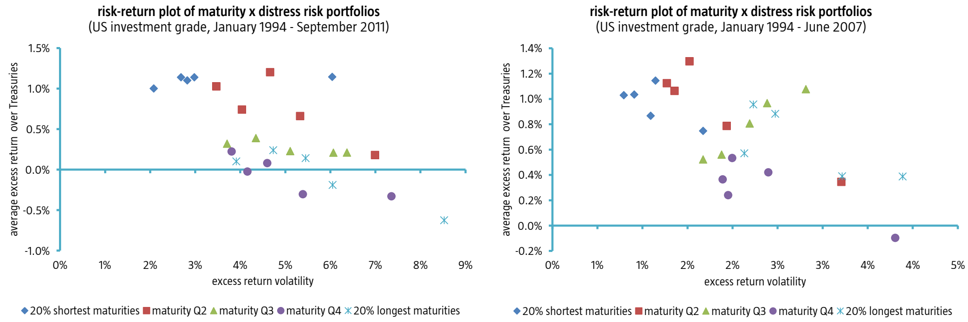

Figure 5 Average and volatility of excess returns of maturity x distress risk portfolios for USD investment grade credits from January 1994 to September 2011 (left graph) and from January 1994 to June 2007 (right graph). Sources: Barclays Capital, FactSet, Robeco Quantitative Strategies.

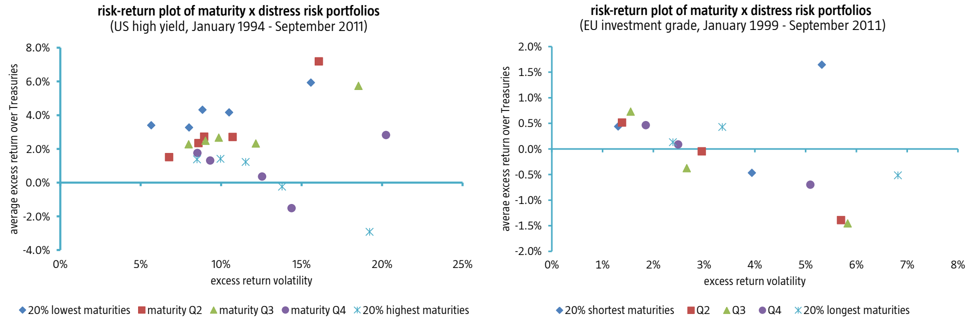

Figure 6 Average and volatility of excess returns of maturity x distress risk portfolios for USD high yield credits from January 1999 to September 2011 (left graph) and for EUR investment grade credits from January 1999 to September 2011 (right graph). Sources: Barclays Capital, FactSet, Robeco Quantitative Strategies.

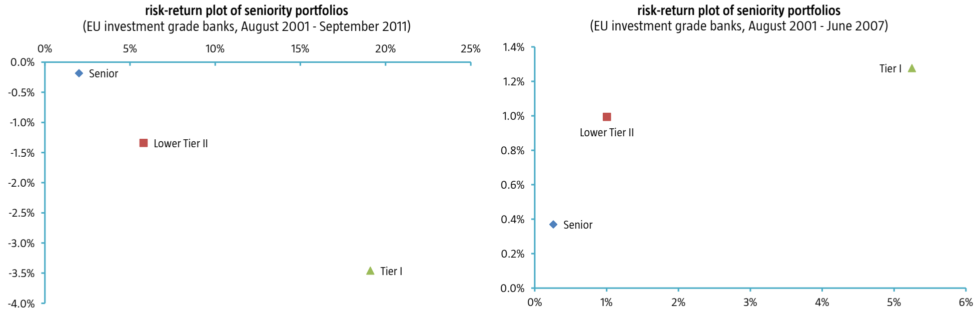

Figure 7 Average and volatility of excess returns of seniority portfolios for EUR investment grade banks from August 2001 to September 2011 (left graph) and to June 2007 (right graph). Sources: Barclays Capital, Robeco Quantitative Strategies.

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The sale of the fund qualifies as a private placement pursuant to section 2 of Uruguayan law 18,627. The fund must not be offered or sold to the public in Uruguay, except in circumstances which do not constitute a public offering or distribution under Uruguayan laws and regulations. The fund is not and will not be registered with the Financial Services Superintendency of the Central Bank of Uruguay. The fund corresponds to investment funds that are not investment funds regulated by Uruguayan law 16,774 dated September 27, 1996, as amended.