Stress Testing Market Report

Testing for the End of the "LTRO Effect"

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Introduction

The European Central Bank's Long-Term Refinancing Operation (LTRO) has altered the relationship between German sovereign yields and 5-year German credit default swap (CDS) spreads. During the first half of 2012, German yields decreased significantly while German CDS spreads widened as the cost of credit protection increased.

In this report, we analyze the "LTRO Effect," which creates additional demand for German bunds because of their safety as collateral. We propose a hypothetical stress test through the lens of RiskManager that explores three elements:

1. The effects of removing LTRO liquidity program
2. A return to higher German yields, and
3. A re-coupling of the bund-CDS relationship.

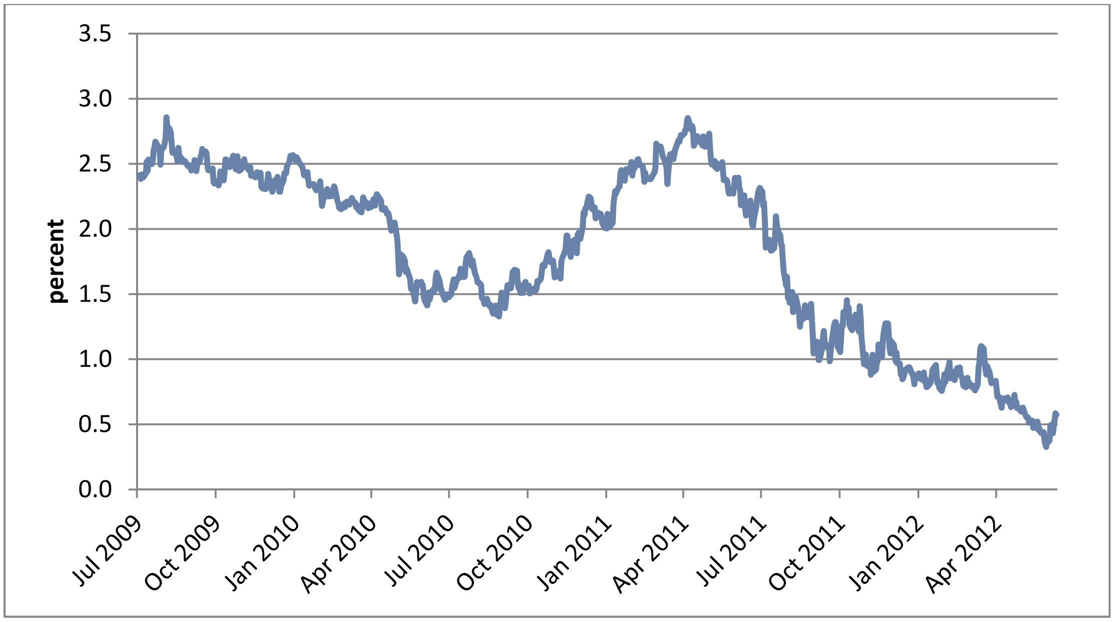
Since the introduction of the LTRO has had positive effects on European equities and risky assets, we analyze this stress on representative equity and fixed income portfolios that are based on these indices:

- MSCI Europe Index
- MSCI World Index
- Bank of America Merrill Lynch EMU Broad Market Index

German Yields Decreased as CDS Spreads Increased

For the first time in history, the return on the two-year German government bond was below zero in June 2012.[1] Figure 1 shows that the 5-year zero coupon yields on German government bonds falling below one percent. Rates on German Bunds have had a decreasing trend since the second quarter of 2011.

Figure 1: The 5-Year Zero-Coupon Bund Yield in EUR.



The decrease in German government bond yields occurred at the same time CDS spreads widened. In early June 2012, the probability of default based on the 5-year CDS spread (see Figure 2) indicated that the riskiness of German government bonds increased during the last two months.

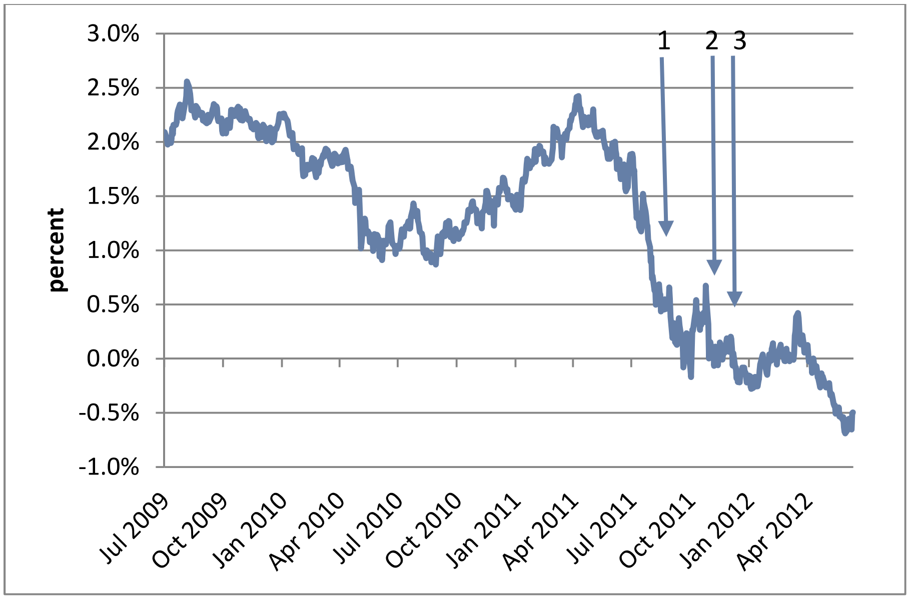
Bund yields and CDS spreads effectively decoupled. The "carry" on a covered bond position of a long hypothetical 5-year constant maturity German government bond position and CDS protection is now negative (see Figure 3).[2] The yields on Bunds are lower relative to a yield that is calculated from a CDS-based valuation.

[1] D Goodman, K Jenkins: *German 2-Year Yield Drops Below Zero As Crisis Deepens*. Bloomberg, June 2, 2012.

[2] The carry on this position is defined as the internal rate of return or yield to maturity of the portfolio that consists of a long government bond and a long CDS protection.

Figure 2: Annual Default Probabilities for Germany Calculated on 5-Year CDS Spreads (assuming a recovery rate of 25 percent).

Figure 3: Yield on a Hypothetical 5-year Constant Maturity Covered Bond (bond + CDS protection).



Events related to large drops:

1: USA downgrade

2: Confidence vote about prime minister Papandreou in Greece

3: The ECB announces the LTRO

What Makes German Bunds So Attractive?

There are several factors that can make bond prices deviate from their CDS-based value.[3] For example, the bond yield can be relatively low compared to the CDS-based value because of the "cheapest-to-deliver" option of the CDS.[4]

The obligation of the German government offers protection against the breakup of the Eurozone as well as global crises.[5] To illustrate this point, we observed that the "carry" on the covered bonds in Figure 3 decreased as additional demand for Bunds increased, due to flight-to-quality behavior during the US sovereign debt downgrade in August 2011 and before the confidence vote about Greek Prime Minister Papandreou in November 2011.

Another source of additional demand is a consequence of the European Central Bank's long-term refinancing operation (LTRO), leading to the "LTRO Effect." The program allows the ECB to lend on a preferential rate to Eurozone banks and accepts Eurozone government bonds as collateral. Bunds provide additional value to the bond holder by creating access to these preferential rates.

What if LTRO Ends? Specifying a Stress Test

Absent of other factors, low government bond rates will revert higher if the monetary easing program no longer provides additional liquidity for the Eurozone. In this case, the extra demand for German government bonds would decline, Bund yields and Eurozone government yields would rise, and the difference between the Bund yield and CDS spread would return to its original pre-LTRO level.

The ECB announced the creation of the LTRO on December 8, 2011. The difference between the 5-year Eurozone government zero-coupon yield and 5-year CDS spread for Germany narrowed by 42 bps (see Figure 3) within one month following the introduction of the program.

To create a stress test for the *end* of the LTRO, we design a scenario where factors move in the opposite direction as they did after the *introduction* of LTRO. In the scenario (see Table 1), we fix the CDS spreads for Germany at their current levels, and shock the 5-year Eurozone government zero coupon yield by 42 bps. This scenario mimics the decrease in the extra demand for Eurozone government bonds at unaffected risk levels.

Table 1: End of the European Central Bank's LTRO – Stress Test Shocks.

Factors	Change
CDS spread for Germany – 60 month	unchanged
Euro Government Debt Benchmark – 60 month	+42 bps

[3] Z Marossy, C Finger: *Quantifying the Bond Basis Risk. A RiskMetrics RiskManager Case Study*. MSCI Product Insight, May 2012.

[4] The CDS protection buyer has a cheapest-to-deliver option when selecting a deliverable obligation in the event of default. This option is priced in the CDS spread and increases it without any increase in the riskiness of the bond issuer.

[5] *Fonds Professionell Online* quoting Dieter Hein: Who buys bonds with a negative yield? June 13, 2012.

Stress Test Results

Table 2 presents the results of the predictive stress testing where the shocks of Table 1 are spread to other factors based on their covariances. The calculations were based on covariances for a 5-day horizon with a lookback period of 3 years and a decay factor of 0.97. The base values of the market factors were as of June 15, 2012.

As the change in the Bank of America Merrill Lynch EMU Broad Market Index indicates, there was a general decline in the Eurozone bond market when the additional source of liquidity was no longer provided for the markets.

Equity markets were also affected by the removal of the liquidity injection: the European and global stock markets represented by the MSCI Europe Index and the MSCI World Index showed losses of 4.52 percent and 4.70 percent, respectively, when measured in Euros. The withdrawal of monetary easing in this hypothetical stress test caused significant indirect effects on equity markets.

Finally, from the US Dollar perspective, the scenario losses were more significant due to a predicted weakening of 0.87 percent of the Euro against the US Dollar.

Table 2: Stress Test Results (5-day horizon with a lookback period of 3 years and a decay factor of 0.97).

Portfolio	Change in EUR	Change in USD
Bank of America Merrill Lynch EMU Broad Market Index	-1.03%	-1.89%
MSCI Europe Index	-4.52%	-5.35%
MSCI World Index	-4.70%	-5.53%

Conclusion

The European Central Bank's Long-Term Refinancing Operation (LTRO) creates extra demand for Eurozone government bonds. This extra demand, resulting in lower rates and the safe haven status of German government bonds, has decoupled Bund yields from CDS prices.

Our models suggest that a hypothetical stress test specifying the end of the "LTRO effect" would force bonds yields back to pre-program levels, and re-couple with CDS spreads. These results suggest that absent of other factors, the disappearance of additional liquidity would cause a general decline in bond markets within the Eurozone and would also have a significant indirect effect on regional and global equity markets.

For assistance implementing this stress test in RiskManager, please contact your customer service representative.

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[1]*As of June 30, 2011, based on eVestment, Lipper and Bloomberg data.*