

Credit Default Swap Pricing and Equity Returns

Extending our equity factor library with the introduction of several credit-to-equity signals

Our recently introduced factor suite for the credit default swap (CDS) market opens up unique and insightful opportunities for systematic approaches to CDS trading and risk management (see *Credit Factor Suite*, April 2012). The indicators range from metrics built using standard financial ratios to fair value estimates, equity analyst revisions and cross-asset insights. Based on the results of our cross-asset signals in particular, here we reverse the process and utilize our industry-leading credit content to introduce unique CDS-based indicators for the equity market. Specifically, our investigation centers on the relationship between CDS spreads and stock prices. The expansion of our factor library includes an important new systematic measure, *Credit Risk*, which demonstrates outperformance in European markets, as well as unique information content from additional indicators including *Credit Revisions – 3 Month*, *CDS Slope – 5 year minus 1 year* and *CDS Divergence*.

INTRODUCTION

Furthering our investigation into cross-asset signaling between the credit and equity markets, here we address the topic of CDS-based risk measures on the predictability of stock prices. The paper outline is as follows. First, we define our new risk themed CDS measures. They include:

- *Credit Risk*
- *CDS Slope – 5 year minus 1 year*
- *Credit Revisions – 3 Month*

With *Credit Risk* as the focal point of the suite, we particularly highlight performance attribution analysis. Next, we examine performance results for the latter two indicators, and round off the report by introducing a unique Relative Value metric, *CDS Divergence*.

DATA AND METHODOLOGY

Markit CDS data powers our factor suite, and is built on a detailed mapping of CDS reference entity to the corresponding corporation and associated listed equity. To date, we have successfully mapped over 2,500 global CDS securities to this database going back as far as 2001. This includes 1,600+ active names as of 10/31/2012. Thus, we can provide detailed company level and cross-asset insights on a broad section of equities.

For this report, we focus on active, senior unsecured CDS that are mapped to an active equity security. Universes include Developed Europe (EUR), Developed Pacific (PAC) and US large caps (USLC). For reference, Figure 1 displays historical counts for each universe. We remark that small cap and emerging market scores are available on our platform; however, we exclude them from our analysis due to limited historical coverage.

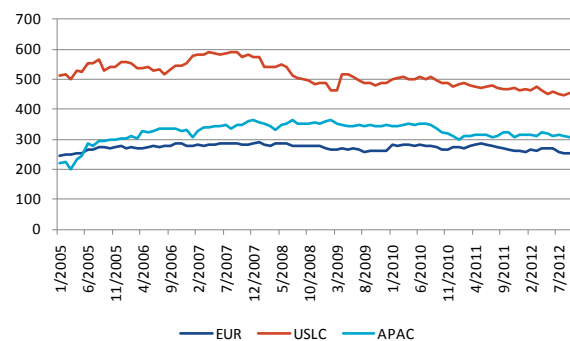


Figure 1: Universe coverage, Jan 2005 – Sep 2012

In the next section we define our factors and report performance results across our universes. Factor scores are tabulated on a monthly basis, and performance is computed in local currency for 1- and 3-month (cumulative) returns. To test factor efficacy, we first calculate the information coefficient (IC) as the correlation between the factor ranks (percentile) and subsequent returns. This measure gives a good indication of signal

performance across the entire universe. To capture performance at the extremes, equal-weight decile returns are also computed. The long/short spread is then calculated based on an investment strategy going long the highest ranked stocks (D1) and short those with the lowest ranks (D10). The spread is simply the difference between these two decile returns (D1 – D10). Hit rates are also included, which represent the percent of positive occurrences for the IC or Spread, respectively. The test period is January 2005 through September 2012.

RESULTS

Credit Risk

The first of our new CDS measures resides in the Liquidity, Risk & Size category. We begin with a measure of CDS-based risk which draws directly on the CDS spread level. *Credit Risk* is measured by CDS levels based on end of day par spreads. Lower risk is preferred.

Credit Risk performance statistics for each universe over the analysis period are summarized in Table 1. We report ICs and decile spreads for 1- and 3-month holding period returns. Statistics include the average (AVG), hit rate and information ratio (IR) which is a risk-adjusted measure of performance.

| | IC | | | | Decile Spread | | | |
|------|-------------------|-------|-------------------|--------|-------------------|--------|-------------------|--------|
| | 1-month | | 3-month | | 1-month | | 3-month | |
| | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR |
| EUR | 0.027 (49%) | 0.138 | 0.042 (59%) | 0.200 | 0.377 (49%) | 0.058 | 1.457 (55%) | 0.120 |
| USLC | 0.016 (54%) | 0.093 | 0.027 (59%) | 0.142 | -0.165 (45%) | -0.021 | -1.273 (58%) | -0.074 |
| PAC | 0.002 (53%) | 0.013 | -0.001 (51%) | -0.007 | -0.307 (49%) | -0.053 | -1.262 (51%) | -0.101 |

Table 1: *Credit Risk* performance statistics, Jan 2005 – Sep 2012

While USLC decile spread AVGs are negative, we report positive 1- and 3-month ICs (hit rates) of 0.016 (54%) and 0.027 (59%), respectively. The resulting 1-month (3-month) IR is 0.093 (0.142). We remark that a significant decile spread downturn in March 2009 (see Figure A1 in the Appendix on Page 9) impacted factor tail results yet had less influence on ICs as a non-parametric (rank) statistic. We also highlight the highest decile spreads in magnitude during the period of the Financial Crisis. Separately we underscore EUR AVG IC and decile spread outperformance with 1-month (3-month) IRs of 0.138 (0.200) and 0.058 (0.120), respectively.

Next we describe market conditions in which *Credit Risk* outperforms. Table 2 reports IRs during months in which the MSCI World index recorded up and down moves in excess of 5% in magnitude since January 2005 (93 months). Note that USLC results are based on the Russell 1000 index (R1000). We also consider months in which the VIX increased more than 20%.

| | MSCI World (R1000) >5% 12 (10) periods | MSCI World (R1000) <-5% 11 (12) periods | VIX >20% 15 periods |
|------|---|--|------------------------|
| EUR | -1.35 | 1.30 | 0.98 |
| USLC | -0.78 | 0.96 | 1.12 |
| PAC | -1.15 | 0.94 | 0.53 |

Table 2: *Credit Risk* IRs, Jan 2005 – Sep 2012

Overall, we observe that *Credit Risk* follows a risk-on/risk-off pattern. In other words, in months when the MSCI World index (R1000) is up more than 5%, higher risk is rewarded as demonstrated by an EUR IR of -1.35 (USLC: -0.78). Conversely, lower risk is desired in strong market downturns with a EUR IR of 1.30 (USLC: 0.96). Likewise, in months when the VIX jumps more than 20%, the USLC IR is 1.12 and, although VIX is a US-based measure, EUR also posts an elevated IR of 0.98.

Next we characterize the fundamental exposures of *Credit Risk* top (D1) and bottom (D10) decile names. Here we utilize the Northfield US Fundamental Risk Model (see www.northinfo.com) to present the monthly factor averages for the test period. Results for USLC are presented in Table 3 (see Page 3) and include universe results to understand the initial effects due to coverage limitations to those names with CDS (see Figure 1 on Page 1).

| Factor | Low Credit Risk (D1) | High Credit Risk (D10) | USLC Credit Risk Universe |
|----------------------|----------------------|------------------------|---------------------------|
| Price/Earnings | 16.34 | 26.80 | 17.15 |
| Price/Book | 2.88 | 1.42 | 1.86 |
| Dividend Yield | 2.26 | 1.21 | 2.02 |
| Trading Activity | 0.14 | 0.37 | 0.21 |
| Relative Strength | 1.05 | 0.91 | 1.03 |
| Market Cap | 61,309.27 | 5,093.32 | 20,575.81 |
| Earnings Variability | 0.37 | 0.73 | 0.54 |
| EPS Growth Rate | 12.40 | 11.20 | 11.03 |
| Price/Revenue | 1.34 | 0.42 | 0.82 |
| Debt/Equity | 0.58 | 1.33 | 0.87 |
| Price Volatility | 0.18 | 0.38 | 0.24 |
| Beta | 0.89 | 1.70 | 1.16 |

Table 3: Credit Risk fundamental factor weighted averages, Jan 2005 – Sep 2012

In general we observe significant biases between D1 and D10 exposures beyond that explained by the composition of the constrained universe. Perhaps not surprisingly, D10 is exposed to higher beta (1.70) and Debt/Equity (1.33) names versus D1 (Beta: 0.89; Debt/Equity: 0.58). At the same time, D1 stocks are described by a significant large cap exposure (\$61.3 billion) relative to D10 (\$5.1 billion). Curiously, we also observe that D10 trades at higher valuation levels based on P/E (26.80) versus D1 (16.34), yet Price/Book, Price/Sales and Dividend Yield show the reverse. Closer inspection of underlying stratifications (results not shown here) suggests the difference was driven by particularly high D1 weights to the lowest P/E bands while D10 had a more uniform distribution across P/E ranges.

Turning to factor attributes, we consider correlation analysis of *Credit Risk* versus common risk measures. EUR results are listed in Table 4 (see Tables A1 and A2 in Appendix on Page 7 for USLC and PAC correlations, respectively). Correlations greater than or equal to 0.70 are highlighted in green.

| | Credit Risk | 1-Month Realized Stock Return Volatility | 60-Month Beta | 60-Day Residual Risk |
|--|-------------|--|---------------|----------------------|
| 1-Month Realized Stock Return Volatility | 0.81 | -- | | |
| 60-Month Beta | 0.74 | 0.91 | -- | |
| 60-Day Residual Risk | 0.78 | 0.92 | 0.84 | -- |
| Altman Z Score | 0.65 | 0.44 | 0.41 | 0.35 |

Table 4: EUR IC correlations, Jan 2005 – Sep 2012

We comment first that while *Credit Risk* is directionally correlated with *1-Month Realized Stock Return Volatility*, *60-Month Beta* and *60-Day Residual Risk*, it is indeed providing differing signal content with lower correlations than those realized with these factors among themselves. It is also correlated to a lesser extent with *Altman Z Score* (ranked such that less risk is preferred) for each universe with USLC (0.37) and PAC (0.21) reporting particularly low co-movement.

Building on the correlation results shown here, we conduct an additional test on the interaction between *60-Month Beta* and *Credit Risk* over the USLC universe. Specifically, we consider the implications of our *Credit Risk* indicator within the high Beta segment of this universe by performing a double sort. We first isolate the highest 25% Beta names in the USLC, and then construct equal-weight quintile portfolios within this segment using our *Credit Risk* indicator. According to the Northfield US Fundamental Risk Model, over 30% of the resulting active return (-41 bps monthly average) can be attributed to our risk measure and not the Northfield model factors. This confirms the hypothesis that *Credit Risk*, especially in high Beta securities, does offer additional insights above that of standard measures. Stay tuned for future research exploring this concept in more detail.

Finally we report IC correlations of *Credit Risk* across our extensive 400+ Factor Library. Table 5 (see Page 4) lists a representative group of the highest (green) and lowest (red) correlated factors. We again confirm that, overall, *Credit Risk* indeed captures unique information content. We also note, in general, positive correlations with volatility-based Price Momentum indicators and negative correlations with Value metrics.

Factor Introduction

| | Factor | Group | Correlation |
|------|---|------------------------|-------------|
| EUR | 24-Month Value at Risk | Price Momentum | 0.872 |
| | Std Dev of FY2 EPS Estimates-to-Price | Earnings Momentum | 0.832 |
| | TTM Sales-to-Price | Deep Value | -0.844 |
| | Current Liabilities-to-Price | Deep Value | -0.794 |
| USLC | At the Money Call Option Implied Volatility | Liquidity, Risk & Size | 0.874 |
| | Change in TTM Sales vs. EPS | Earnings Quality | 0.844 |
| | Stock Illiquidity | Liquidity, Risk & Size | -0.796 |
| | Industry Relative Book-to-Market | Relative Value | -0.739 |
| PAC | Stock Return Volatility | Liquidity, Risk & Size | 0.739 |
| | 24-Month Residual Return Variance | Price Momentum | 0.696 |
| | 2-Year Ahead EPS Growth | Earnings Momentum | -0.593 |
| | SG&A Expenses-to-Sales | Management Quality | -0.582 |

Table 5: *Credit Risk* top and bottom IC correlations, Jan 2005 – Sep 2012

CDS Slope – 5 year minus 1 year

We turn next to additional measures of CDS-based risk derived from credit risk level. We begin with *CDS Slope – 5 year minus 1 year* which is computed as the difference between the par spread of the 5-year CDS security and that of the 1-year CDS security. Spread valuations rely on assumptions surrounding the reference entity risk and the probability of future default. A higher spread indicates greater credit risk for the underlying entity. Therefore, smaller differences are preferred implying an ascending factor ordering.

While *CDS Slope – 5 year minus 1 year* ICs are mostly neutral across each universe (Table 6), we note a positive 1-month (3-month) USLC decile spread of 0.642% (2.522%). Conversely, EUR 1- and 3-month decile spreads are slightly negative at -0.098% and -0.366%, respectively. We further expound on the EUR time series results in Figure A2 (see the Appendix on Page 9). The image depicts a cyclical pattern with a robust rebound off of the March 2009 market bottom and a string of negative returns since the onset of the Eurozone debt crisis in January 2010 with upturns more recently following the ebbs and flows of investor sentiment regarding Eurozone debt resolution. We also remark that *CDS Slope – 5 year minus 1 year* is correlated with *Credit Risk* at a level of 0.53 (0.69) for EUR (USLC).

| | IC | | | | Decile Spread | | | |
|------|----------------|-------|----------------|-------|----------------|--------|----------------|--------|
| | 1-month | | 3-month | | 1-month | | 3-month | |
| | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR |
| EUR | 0.008 (49%) | 0.057 | 0.013 (52%) | 0.087 | -0.098 (48%) | -0.023 | -0.366 (44%) | -0.049 |
| USLC | 0.016 (53%) | 0.120 | 0.030 (60%) | 0.213 | 0.642 (53%) | 0.117 | 2.522 (55%) | 0.194 |
| PAC | 0.010 (51%) | 0.079 | 0.016 (55%) | 0.124 | 0.427 (49%) | 0.109 | 1.025 (54%) | 0.145 |

Table 6: *CDS Slope – 5 year minus 1 year* performance statistics, Jan 2005 – Sep 2012

Credit Revisions – 3 Month

Our second credit-level derivative measure is *Credit Revisions – 3 Month*. This indicator measures the change in CDS levels over the past 3 months. Revisions to lower risk are preferred; hence, our strategy is to buy (sell) stocks with the most CDS spread tightening (widening).

Performance statistics are summarized in Table 7 (see Page 5). In general, we observe positive results. USLC posted a 1-month (3-month) AVG of 0.235% (0.218%) with a hit rate of 55% (66%). While EUR reported a 1-month AVG (hit rate) of 0.059% (55%), stronger returns are seen at the 3-month horizon with an AVG (hit rate) of 0.877% (62%) which translated to an IR 0.089 (see Figure A3 in Appendix). Lastly, we highlight that *Credit Revisions – 3 Month* has a weak correlation with *Credit Risk* of 0.30 (0.35) in EUR (USLC).

| | IC | | | | Decile Spread | | | |
|------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
| | 1-month | | 3-month | | 1-month | | 3-month | |
| | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR |
| EUR | 0.021 (61%) | 0.149 | 0.015 (51%) | 0.094 | 0.059 (55%) | 0.012 | 0.877 (62%) | 0.089 |
| USLC | 0.006 (54%) | 0.055 | 0.018 (56%) | 0.180 | 0.235 (55%) | 0.047 | 0.218 (66%) | 0.019 |
| PAC | -0.005 (53%) | -0.037 | -0.027 (45%) | -0.196 | -0.140 (43%) | -0.035 | -0.444 (44%) | -0.070 |

Table 7: Credit Revisions – 3 Month performance statistics, Jan 2005 – Sep 2012

CDS Divergence

We round out the analysis with a focus on a unique Relative Value measure, *CDS Divergence*, based on a proprietary model that links equity price to CDS spread. Similar to our indicator for the CDS market, this factor measures the historical linkage between the equity price and CDS spread of a particular company. It then captures the divergence between the expected equity price given the most recent CDS spread and the actual current price. This residual value is adjusted by the strength of the historical cross-asset relationship, and ranked in descending order such that a high level of positive (negative) divergence indicates the equity valuation should increase (decrease).

CDS Divergence IC AVGs are neutral across each universe for 1- and 3-month holding periods (Table 8). For EUR, we report a 1-month decile spread AVG (hit rate) of 0.240% (55%) and IR of 0.061. The results persisted to 3-month holding periods with an IC (decile spread) AVG of 0.015 (0.393%). USLC and PAC performance tended to be weaker.

| | IC | | | | Decile Spread | | | |
|------|----------------|--------|----------------|-------|----------------|-------|----------------|-------|
| | 1-month | | 3-month | | 1-month | | 3-month | |
| | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR | AVG (Hit Rate) | IR |
| EUR | 0.008 (57%) | 0.058 | 0.015 (58%) | 0.117 | 0.240 (55%) | 0.061 | 0.939 (64%) | 0.141 |
| USLC | 0.006 (51%) | 0.049 | 0.002 (53%) | 0.017 | 0.089 (51%) | 0.024 | 0.000 (58%) | 0.000 |
| PAC | -0.001 (54%) | -0.008 | 0.010 (52%) | 0.080 | 0.270 (49%) | 0.060 | 0.588 (52%) | 0.070 |

Table 8: *CDS Divergence* performance statistics, Jan 2005 – Sep 2012

We remark that strong returns in EUR (see Figure A5 in the Appendix on Page 9) are recorded particularly during 2007 – 2008 which coincides with the Financial Crisis while the weakest returns are in more recent months as optimism spread for resolution to the European debt crisis. Not surprisingly, the largest USLC drawdown occurred in April 2009 (see Figure A5 in Appendix) as quantitative methods experienced extreme returns in light of the risk-off trade subsequent to market bottoms.

Next we take a look at *CDS Divergence* focusing once again on market episodes characterized by extreme price movements. Table 9 lists the top Value metrics' IRs during months since January 2005 when the MSCI World index has lost more than 5% (12 periods). We highlight a robust IR of 0.746 and the leading decile spread of 3.172%. We also note that *CDS Divergence* was the weakest performer (results not shown here) during market upturns in excess of 5% (11 periods). Similar outcomes are reported for USLC (see Table A3 in the Appendix on Page 8) although less informative for PAC (results not show here).

| | IR | Decile Spread |
|--|--------------|---------------|
| TTM Capital Expenditures-to-Price | 1.376 | 2.244 |
| Industry Relative TTM Oper Cash Flow-to-Total Assets | 0.904 | 1.724 |
| TTM Free Cash Flow-to-Enterprise Value | 0.772 | 2.103 |
| CDS Divergence | 0.746 | 3.172 |
| 5-yr Relative TTM Free Cash Flow-to-Price | 0.675 | 2.101 |
| 5-yr Relative TTM Oper Cash Flow-to-Price | 0.343 | 1.344 |
| Industry Relative TTM Free Cash Flow-to-Price | 0.178 | 1.180 |
| TTM Dividend Yield | 0.165 | -0.576 |
| TTM Free Cash Flow-to-Price | 0.151 | 0.825 |
| Price-to-Total Assets | 0.143 | 1.414 |

Table 9: EUR top performers when MSCI World < -5%, Jan 2005 – Sep 2012

Factor Introduction

Finally we report *CDS Divergence* IC correlations with several common Value measures. We remark on a consistent negative relation in EUR (Table 10) with each indicator suggesting that this factor captures a unique valuation signal. USLC and PAC results (see Tables A4 on Page 9 and A5 on Page 10, respectively, in the Appendix) are similar in general with low and mostly negative correlations across this representative list of Value metrics.

| | CDS Divergence | Industry Relative Leading 4-QTRs EPS to Price | 5-yr Relative TTM Earnings-to-Price | Book-to-Market | Predicted Dividend Yield | TTM Sales-to-Price |
|---|----------------|---|-------------------------------------|----------------|--------------------------|--------------------|
| Industry Relative Leading 4-QTRs EPS to Price | -0.56 | | | | | |
| 5-yr Relative TTM Earnings-to-Price | -0.32 | 0.51 | | | | |
| Book-to-Market | -0.54 | 0.60 | 0.24 | | | |
| Predicted Dividend Yield | -0.25 | 0.54 | 0.54 | 0.23 | | |
| TTM Sales-to-Price | -0.63 | 0.64 | 0.14 | 0.79 | 0.08 | |
| Price-to-Total Assets | -0.05 | -0.14 | -0.08 | -0.01 | -0.20 | 0.07 |

Table 10: EUR IC correlations, Jan 2005 – Sep 2012

CONCLUSION

We recently launched a new suite of systematic factors designed to enhance trading and risk management strategies in the CDS market. Built using an intricate corporate mapping hierarchy, the library currently includes 75+ measures covering a global universe of over 1,500 names. Indicators range from metrics built using standard financial ratios to fair value estimates, equity analyst estimates and cross-asset insights. Based on proven information gleaned from cross-asset signals, we now leverage our CDS factor library to introduce several examples of systematic approaches to equity pricing.

Our new measures include three Liquidity, Risk & Size signals, *Credit Risk*, *CDS Slope – 5 year minus 1 year*, and *Credit Revisions – 3 Month*, which capture the relationship between equities and CDS as cross-asset signals.

We begin with a focus on the key factor, *Credit Risk*. We find that *Credit Risk* indeed posts outperformance particularly in Europe and to a lesser extent in terms of IC statistics for North America. For example, in EUR we report a 3-month decile spread average (hit rate) of 1.457% (55%). However, results are weak in Asia-Pacific.

Moreover, CDS spreads captured by *Credit Risk* are especially informative of equity pricing in trending with risk-on/risk-off market episodes. Our attribution analysis also confirms unique information content among Liquidity, Risk & Size indicators with some exposure to volatility-based Price Momentum. USLC fundamental exposures reveal biases to high beta and lower market cap for the highest risk names. Building on this, we further show that our *Credit Risk* indicator delivers exceptional differentiation ability within high beta names.

Next, we examine performance results for the latter two indicators which are derivative measures off of the base *Credit Risk* factor. *CDS Slope – 5 year minus 1 year* posted a strong USLC 1-month decile spread average of 0.642% which persisted to a 3-month holding period average of 2.522%. *Credit Revisions – 3 Month* outperformed in EUR with a 3-month decile spread average (hit rate) of 0.877 (62%). Both metrics also displayed low correlations with *Credit Risk*.

Finally, we present *CDS Divergence* which is a Relative Value measure capturing the historical linkage between the equity price and CDS spread of a particular company. Performance was strongest in EUR with a 3-month average decile spread (hit rate) of 0.939% (64%) and in general describes a unique valuation signal with particularly robust results in extreme market downturns.

APPENDIX

CDS Background

A CDS is an insurance-like contract that promises to cover losses on a specified security in the event of a default. A default is represented by deteriorating financial condition and includes events such as bankruptcy, restructuring, failure to make payment on an obligation or acceleration of obligation, among others.

CDS contracts, standardized by the International Swaps and Derivative Association (ISDA), are an agreement between two participants to exchange the credit risk of an issuer referred to as the reference entity. The CDS buyer purchases protection against a worsening credit condition of the reference entity and is said to be short risk. The CDS seller collects a periodic fee from the buyer for assuming the underlying credit risk and is said to be long risk. The duration of the contract is based on the specified agreement, typically five years, or until a pre-defined ISDA credit event is triggered.

CDS market prices represent the quoted credit risk of the reference entity. Prices are reported in the form of spreads, or the annual payment to be paid by the protection buyer. Payments are made quarterly and quoted in basis points (bps) of the notional contract amount. Higher prices imply a greater credit risk. Valuations rely on assumptions surrounding reference entity risk and the probability of future default.

Prior studies of the relationship between the US stock market and the CDS market include Fung, et al (2008). At the index level, they determined that the stock market leads the CDS investment grade index, but there is mutual feedback between the stock market and the CDS high yield index. Their conclusion is that both markets matter and both can lead during various economic times. Greatrex (2009) further concluded that monthly CDS spread changes are determined by changes in the CDX index, leverage and volatility.

Tables

| | Credit Risk | 1-Month Realized Stock Return Volatility | 60-Month Beta | 60-Day Residual Risk |
|---|-------------|--|---------------|----------------------|
| 1-Month Realized Stock Return Volatility | 0.85 | -- | | |
| 60-Month Beta | 0.81 | 0.92 | -- | |
| 60-Day Residual Risk | 0.88 | 0.97 | 0.92 | -- |
| Altman Z Score | 0.37 | 0.10 | 0.12 | 0.08 |

Table A1: USLC IC Correlations, Jan 2005 – Sep 2012

| | Credit Risk | 1-Month Realized Stock Return Volatility | 60-Month Beta | 60-Day Residual Risk |
|---|-------------|--|---------------|----------------------|
| 1-Month Realized Stock Return Volatility | 0.72 | -- | | |
| 60-Month Beta | 0.69 | 0.80 | -- | |
| 60-Day Residual Risk | 0.74 | 0.93 | 0.82 | -- |
| Altman Z Score | 0.21 | 0.10 | 0.14 | -0.04 |

Table A2: PAC IC Correlations, Jan 2005 – Sep 2012

Factor Introduction

| | IR | Decile Spread |
|--|--------------|---------------|
| Industry Relative TTM Oper Cash Flow-to-Total Assets | 1.401 | 3.078 |
| Predicted Dividend Yield | 0.674 | 3.359 |
| TTM Pretax Income-to-Price | 0.652 | 1.850 |
| TTM Capital Expenditures-to-Price | 0.648 | 2.570 |
| EV to Invested Capital | 0.583 | 3.143 |
| Indicated Dividend Yield | 0.569 | 1.775 |
| Edwards-Bell-Ohlson Value-to-Price | 0.554 | 1.057 |
| TTM EPS after Extra Items-to-Price | 0.516 | 1.729 |
| CDS Divergence | 0.456 | 1.809 |
| TTM EPS before Extra Items-to-Price | 0.442 | 1.351 |

Table A3: USLC top performers when R1000 < -5%, Jan 2005 – Sep 2012

| | CDS Divergence | Industry Relative Leading 4-QTRs EPS to Price | 5-yr Relative TTM Earnings-to-Price | Book-to-Market | Predicted Dividend Yield | TTM Sales-to-Price |
|---|----------------|---|-------------------------------------|----------------|--------------------------|--------------------|
| Industry Relative Leading 4-QTRs EPS to Price | -0.36 | | | | | |
| 5-yr Relative TTM Earnings-to-Price | -0.36 | 0.43 | | | | |
| Book-to-Market | -0.53 | 0.28 | 0.05 | | | |
| Predicted Dividend Yield | 0.04 | -0.09 | 0.04 | 0.13 | | |
| TTM Sales-to-Price | -0.52 | 0.36 | 0.08 | 0.82 | -0.06 | |
| Price-to-Total Assets | -0.46 | 0.18 | -0.08 | 0.95 | 0.27 | 0.74 |

Table A4: USLC IC correlations, Jan 2005 – Sep 2012

| | CDS Divergence | Industry Relative Leading 4-QTRs EPS to Price | 5-yr Relative TTM Earnings-to-Price | Book-to-Market | Predicted Dividend Yield | TTM Sales-to-Price |
|---|----------------|---|-------------------------------------|----------------|--------------------------|--------------------|
| Industry Relative Leading 4-QTRs EPS to Price | -0.10 | | | | | |
| 5-yr Relative TTM Earnings-to-Price | -0.18 | 0.17 | | | | |
| Book-to-Market | -0.28 | -0.13 | 0.14 | | | |
| Predicted Dividend Yield | 0.10 | 0.14 | 0.15 | 0.25 | | |
| TTM Sales-to-Price | -0.21 | -0.27 | 0.04 | 0.85 | 0.11 | |
| Price-to-Total Assets | 0.12 | -0.05 | 0.03 | -0.03 | 0.34 | 0.02 |

Table A5: PAC IC correlations, Jan 2005 – Sep 2012

Figures

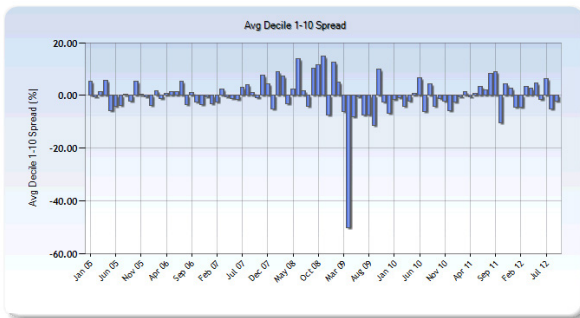


Figure A1: USLC Credit Risk decile spreads, Jan 2005 – Sep 2012

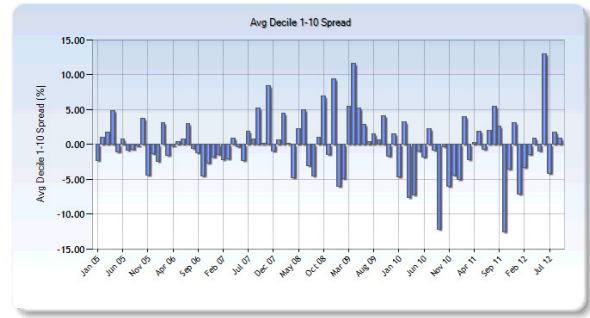


Figure A2: EUR CDS Slope – 5 year minus 1 year decile spreads, Jan 2005 – Sep 2012

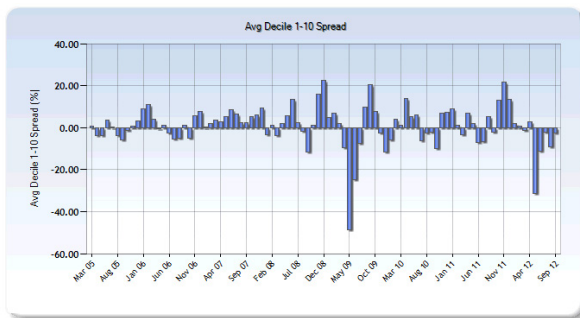


Figure A3: EUR Credit Revisions – 3 Month cumulative 3-month decile spreads, Mar 2005 – Sep 2012

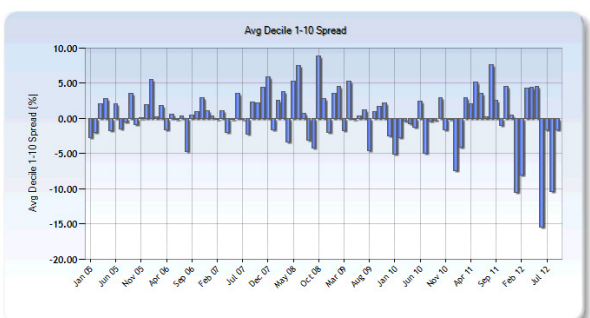


Figure A4: EUR CDS Divergence decile spreads, Jan 2005 – Sep 2012

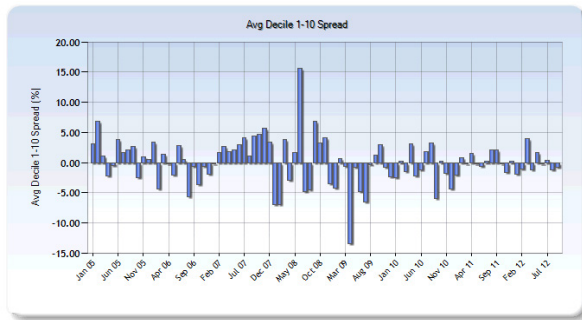


Figure A5: USLC CDS Divergence decile spreads, Jan 2005 – Sep 2012

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