Lincoln US Senior Debt Index

Lincoln European Senior Debt Index

LINCOLN
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Introduction

Lincoln International's ("Lincoln") Valuations & Opinions Group ("VOG") have created two private credit market senior debt indices: (a) United States Senior Debt Index; and, (b) European Senior Debt Index.

Both the United States and European Lincoln Senior Debt Index ("Lincoln SDI" or "LSDI") measure the total return of illiquid senior debt facilities, defined as a first lien loan, second lien loan, and Unitranche loan, issued primarily to sponsored companies (i.e., private equity owned) in the United States and Europe. Bifurcated by geography, the United States and European Senior Debt Index compute the total return of loans based upon the sum of: (a) income return; and, (b) capital gain/loss return. In addition, the Lincoln SDI computes other descriptive statistics, including yield, spread, and price (fair value).

VOG compiles the Lincoln SDI based on the population of companies fair valued every quarter. On a quarterly basis, Lincoln values more than 5,750 private companies primarily owned by over 175 alternative investment funds and lenders to funds. These companies are levered via borrowings from the direct lending market. A significant percentage of the LSDI constituents are based upon valuations of loans provided to private credit funds and, therefore, fair value information will not be publicly disclosed.

VOG collaborated with Professor Pietro Veronesi of University of Chicago Booth School of Business to create the Senior Debt Index. The data is based on valuations VOG provides to its clients, including public business development companies ("BDCs" relevant for US based funds), private BDCs, and other private credit funds throughout the world. The Lincoln SDI is unique in that it is based on illiquid – and private – loan information issued to private equity sponsored portfolio companies in the opaque senior direct lending market. In the United States there is very limited public data about loans issued in the direct lending market. The limited data that does exist is provided in the Schedule of Investments contained within the SEC filings of publicly traded BDCs. However, BDCs market share has declined relative to non-public funds. In Europe, information about the direct lending market is even more limited. The Lincoln SDI is published prior to the completion of the filing of public BDCs quarterly and annual financial statements, allowing managers to timely compare their portfolios.

Source of Data

On a quarterly basis, VOG completes portfolio valuations for over 5,750 portfolio companies from a broad array of private equity investors and non-bank lenders. These companies are levered with debt financing provided via the direct lending market and Lincoln estimates the fair value of at least one senior debt security in the portfolio companies' capital structure as well as its enterprise value.

Each portfolio company valuation is individually prepared predicated on valuation methodologies consistent with GAAP, IFRS and valuation professional organizations. The analyses are then vetted by fund management, their governance committees and auditors. Upon concluding each quarterly portfolio company valuation, VOG aggregates the underlying financial performance, senior debt and enterprise value to create each index.

Sample Size and Criteria

Lincoln conforms to well accepted fixed income valuation methodologies to value private debt. The fair value of the loan, which is typically a floating rate instrument, is computed by calculating its risk adjusted present value cash flow. This method estimates the fair value of the loan by forecasting the contractual cash flows of the loan and discounting the cash flows based upon a market participant discount rate which considers both market required interest rates and spreads and credit specific factors.

The Lincoln Senior Debt Index is designed to replicate an unimpaired portfolio of senior loans. Given that the LSDI is computing quarterly returns:

1. a loan must be valued in two consecutive quarters; and,
2. the index is fair value weighted such that no individual loan can represent more than 2.0% of the overall index in a given quarter, weighted based on the aggregate fair values of the securities in the index.

The Lincoln Senior Debt Index excludes loans to:

1. non-operating companies such as passive real estate or specialty finance companies;
2. early-stage venture businesses;
3. loans to companies in financial distress defined as loans with a fair value less than 80% of par, and/or, yield-to-maturity ("YTM") greater than 25%.[1]

The final step is to construct the index based on those companies meeting the above criteria (i.e., the index constituents). Given the large number of loans valued on a quarterly basis, confidentiality of all company-specific information is maintained.

In the United States, Lincoln has created:

1. Three sub-indices by loan facility classification in the Lincoln SDI: (a) all senior loans, consisting of Unitranche, first lien, and second lien loans; (b) first lien and Unitranche loans; and, (c) second lien loans; and,
2. Three sub-indices categorized by EBITDA size: (a) less than $30.0 million; (b) between $30.0 million and $100.0 million; and, (c) greater than $100.0 million.
3. In Europe, given the smaller market size, we have created only an all-loans index.

Index Calculation – Quarterly Return

The Lincoln SDI measures total return. Total return is the sum of: (1) income return (i.e., accrued 3-month interest); plus/minus; (2) quarter over quarter unrealized gain or loss. The quarterly change in fair value is based on Lincoln's fair value, per quarter, for every loan in the SDI.

Almost all loans in the private credit market are priced based on a floating rate (i.e., SOFR in the United States or Euribor or SONIA in Europe) plus a spread. It is also common that direct lending loans contain interest rate floors.

The index is computed as follows:

1. Compute returns for individual securities

$$R^i(t, t+1) = \frac{FV^i(t+1) \times Pr^i(t+1) - FV^i(t) \times Pr^i(t) + C^i(t) \times Pr^i(t)}{FV^i(t) \times Pr^i(t)}$$

Where:

$FV^i(t)$ = Lincoln Fair Value of loan i in quarter t

$FV^i(t+1)$ = Lincoln Fair Value of loan i in quarter $t+1$

$Pr^i(t)$ = Principal of the loan i on quarter t

[1] A loan is excluded upon the second consecutive quarter in which its value is less than 80% of par and/or a YTM of 25%. The LSDI will capture the first quarter the loan declines to less than 80% of par and/or a YTM of 25%.

$C^i(t)$ = Coupon of loan i at time t

2. Next, the weights of each loan are computed.

$$w^i(t) = \frac{FV^i(t) \times Pr^i(t)}{\sum_{j=1}^{n(t)} FV^j(t) \times Pr^j(t)}$$

3. The weights are capped at 2% (based on their respective fair value). This is accomplished by increasing all other weights proportionally over their value weights.

4. The portfolio return is computed as:

$$R(t, t+1) = \sum_{i=1}^{n(t)} w^i(t) \times R^i(t, t+1)$$

where $n(t)$ denotes the number of securities available at time t.

5. The **Total Return** index is

$$Idx(t+1) = Idx(t) \times (1 + R(t, t+1))$$

where $Idx(0) = 100$

6. The total return can then be decomposed into **Income Return** and **Capital Gain Return**

$$R_{Income}(t, t+1) = \sum_{i=1}^{n(t)} w^i(t) \times R^i_{Income}(t, t+1)$$

$$R_{CG}(t, t+1) = \sum_{i=1}^{n(t)} w^i(t) \times R^i_{CG}(t, t+1)$$

where

$$R^i_{Income}(t, t+1) = \frac{C^i(t)}{FV^i(t)}$$

and

$$R^i_{CG}(t, t+1) = \frac{FV^i(t+1) \times Pr^i(t+1) - FV^i(t) \times Pr^i(t)}{FV^i(t) \times Pr^i(t)}$$

7. From the Income Return and the Capital Gain Return, two sub-indices can be calculated

   a. The Income Return Index:

   $$Idx_{Income}(t+1) = Idx_{Income}(t) \times (1 + R_{Income}(t, t+1))$$

   b. The Capital Gain Index

   $$Idx_{CG}(t+1) = Idx_{CG}(t) \times (1 + R_{CG}(t, t+1))$$

- where $Idx_{Income}(0) = 100$
- where $Idx_{CG}(0) = 100$

Bifurcation of Quarterly Return

The Lincoln Senior Debt Index also bifurcates quarterly total return into the return from credit risk and return from interest rate risk.

Overview:

- The value of a risk-free loan equals the value of a risky loan plus the value of a credit derivative (i.e., credit insurance).
    - Formulaically we compute the value and returns of a risk-free loan and risky loan in order to determine the amount of impact to the quarterly return from changes in the reference rate (i.e., SOFR, SONIA or Euribor). The difference between the total quarterly return less the quarterly return from the reference rate equals the quarterly return due to credit risk.
- Interest rate risk (i.e., SOFR, SONIA or Euribor) is defined as the quarterly change in total return per loan arising solely from changes in the maturity matched reference rate.
- Credit risk is the residual difference representing the difference between the quarterly total return of the Lincoln Senior Debt Index less the quarterly total return due to changes in the reference rate or interest rate risk.[2]
- The quarterly discount rate for a risky loan is computed as the sum of: (1) the maturity matched reference rate; plus, (2) the measurement dates market participant credit spread.
- The quarterly discount rate for a risk-free loan is computed based on the maturity matched reference rate which excludes a credit spread as it is risk free loan.

Procedure for Bifurcating the Change in Quarterly Total Return Between Interest Rate Risk and Credit Risk:

- **Step 1 – Compute the Quarterly Total Return - *Fair Value Basis*** (i.e., the quarterly return of a risky loan) - Compute the quarterly return of each loan in the index. This is our calculation used to determine the SDI's quarterly return on a fair value basis.
- **Step 2 – Compute the Quarterly Total Return - *Risk Free Basis*** – Re-run the SDI but compute the quarterly total return of each loan with the discount rate being only the reference rate (i.e., the discount rate excludes a spread and is only the maturity matched reference rate). On a loan-by-loan basis, this equals the total interest return on a risk-free basis per quarter.

    A. The numerator or cash flows are based on the contractual cash flows (the contractual cash flows include the LIBOR floor benefit and contractual spreads); divided by,

    B. The denominator or the maturity-matched reference rate excluding a spread.

    C. The difference in return between quarter 2 minus quarter 1 equals the return from interest rate risk (i.e., the impact to return arising solely due to changes in interest rates).

    Note:

[2] The credit risk component is a residual amount and, in theory, can be further decomposed into other factors such as illiquidity (i.e., the direct lending market is more illiquid than the broadly syndicated loan market). However, allocating a portion of the total return from credit risk to the percentage due to illiquidity creates significant measurement issues. We continue to evaluate whether we can capture the amount of illiquidity risk that is embedded in credit risk via a comparison to the broadly syndicated market or other liquid fixed income market but have yet to determine a reliable solution to this issue.

(1) the reference rate in the discount rate excludes a spread; in other words, it is only the reference rate maturity matched spot curve.

(2) The Index is computed based on the weighted average of the total returns.

Step 3 – Determine the Change in Total Return Associated with Credit Risk (i.e., Credit Risk Return)

A. Compute: Quarterly Return Fair Value Basis (Step 1) minus the Quarterly Return on a Risk-Free Basis (Step 2) approximately equals the quarterly change in total return due to credit risk.

Step 4 - Steps 1 through 3 are computed at the security level. Step 4 aggregates of these security level returns to the SDI level.

Summary:

- The quarterly return is computed in Step 1.
- The quarterly total return impact from changes in interest rate risk is the amount computed in Step 2.
- The quarterly total return impact from credit risk is the amount computed in Step 3.
- *Note*: returns are weighted such that no one loan can be more than 2% of the SDI.

Academic Advisor

Professor Pietro Veronesi is a Senior Advisor to Lincoln's Valuations and Opinions Group. He is the Chicago Board of Trade Professor of Finance at the University of Chicago, Booth School of Business. He is also a research associate of the National Bureau of Economic Research and a research fellow of the Center for Economic and Policy Research. Additionally, he is a former director of the American Finance Association and co-editor of the Review of Financial Studies. He conducts research that focuses on asset pricing, stock and bond valuation under uncertainty, bubbles and crashes, return predictability and stochastic volatility. His work has appeared in numerous publications, including the *Journal of Political Economy, American Economic Review, Quarterly Journal of Economics, Journal of Finance, Journal of Financial Economics, and Review of Financial Studies*. He is the recipient of several awards, including the 2015 AQR Insight award, the 2012 and 2003 Smith Breeden prizes from the *Journal of Finance*; the 2008 WFA award; the 2006 Barclays Global Investors Prize from the EFA; the 2006 Fama/DFA prizes from the Journal of Financial Economics; and the 1999 Barclays Global Investors/Michael Brennan First Prize from the *Review of Financial Studies*.

Professor Veronesi teaches both masters- and PhD-level courses. He is the recipient of the 2009 McKinsey Award for Excellence in Teaching.

His undergraduate work was in economics at Bocconi University where he received a laurea *magna cum laude* with honor in 1992. He earned a master's degree with distinction in 1993 from the London School of Economics. He joined the Chicago Booth faculty upon obtaining his PhD in Economics from Harvard University in 1997.

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VOG is widely recognized for leveraging Lincoln International's "real world" transaction experience from its M&A and debt advisory practices to assist its clients in the determination of fair value. Lincoln International's highly skilled professionals have extensive experience in determining and supporting fair value measurements for traditional and complex securities.

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