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Corporate Credit Research | North America

# Defaults Through the Cycle

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We explore the methodologies we use to project defaults, our thoughts on default expectations both in the short term and over the course of the cycle, and ways to think about sectors that could be most at risk when the cycle ultimately turns.

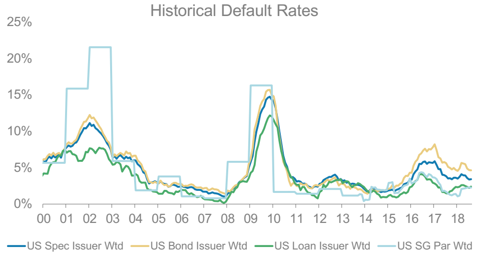
**Recent default trends:** Default rates declined throughout much of 2017 as Energy headwinds faded, but more recently have slowed their descent, even starting to inch higher in some cases (i.e., par-weighted speculative grade and loan issuer-weighted). We note that this change in trend has occurred at levels above 2014 default rates, when credit spreads originally hit cycle tights (prior to 2018). We would describe the current default environment as still benign, but with risks creeping higher, consistent with many other late-cycle signals that have increasingly popped up this year.

**Short-term expectations:** To forecast one-year default rates, we rely on a top-down macro model, which points to a HY issuer-weighted default rate of around 3.3% over the next year. Keep in mind, while one-year default forecasts have some value, we have always argued that they are not that useful in predicting the near-term direction of the market, mainly because spreads move before defaults. In other words, the default rate in 2019 was likely already priced into the market in 2018. What matters most, in our view, is when defaults will begin inflecting higher more notably.

**Longer-term forecasts:** Based on a framework we use to time the inflection, defaults may drift modestly higher in 2019, rising more significantly in 2020, and peak in 2021, though that clearly depends in part on timing around the next recession. More broadly, 2008/09 was an abnormally sharp, but short default cycle. We think the next one may be slower, more like the early 2000s. We assume a 5Y cumulative default rate in the next credit cycle of 25.0% for HY and 24.2% for loans, with lower recovery rates (particularly for loans). This type of cycle could drive very different outcomes for pockets of credit markets (i.e., CLOs) than last time around.

**Looking for the problems:** First, we note that sectors which account for the biggest share of debt growth in the bull market often have the biggest problems when the cycle turns. This would have pointed to Telecom in the late 1990s and Energy in 2014. Second, sectors that make up the highest percentage of the levered "tail" also tend to drive defaults in the long term. With this in mind, in the loan market, Tech stands out as most at risk, followed by Retail, Consumer Cyclicals (ex-Retail), and Healthcare. In HY, Retail is also at risk, as well as Healthcare, Consumer Non-cyclicals, and Telecom.

**Exhibit 1:** Par-weighted default rates have been inching higher; we expect default expectations to start rising in 2019



Source: Morgan Stanley Research, Moody's Investors Service

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# Introduction

In the note that follows, we explore the methodologies we use to project defaults, our thoughts on default expectations both in the short term and over the course of the cycle, and ways to think about sectors that could be most at risk when the cycle ultimately turns. Summing up, current default rates are low, but not as low as they were in 2014, when credit spreads originally hit cycle tights (prior to 2018). The default rate will likely stay reasonably low in 2019, as defaults take time to play out, but we think monthly default volumes will inch higher next year as growth decelerates and monetary policy tightens further.

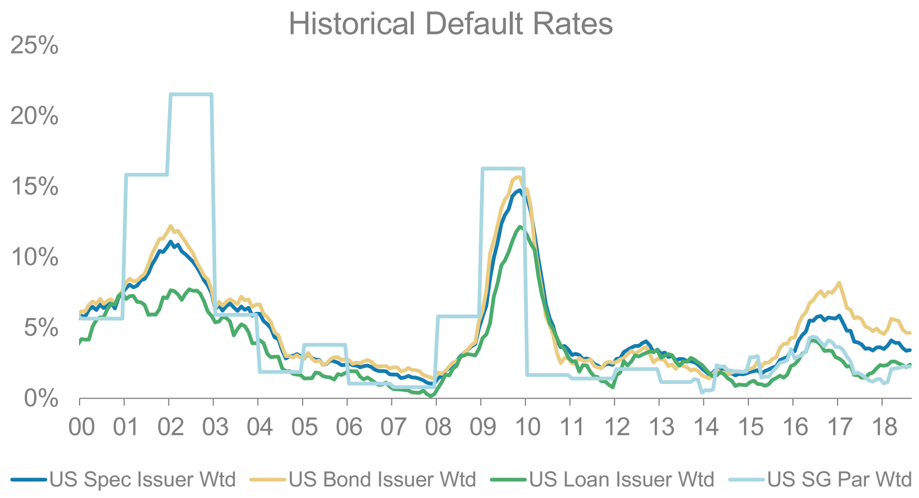
When defaults peak in part depends on timing around the next downturn. Our work points to 2020 as the first year of a multi-year default cycle, with 2021 as a potential peak default year, but remember, credit markets will move well ahead of time. We assume a cumulative default rate over the next cycle of 25.0% for HY and 24.2% for loans, less severe than the 1989 and 1999 5Y cohorts, but more severe than the 2008 cohort. This translates into ~$700 billion in US HY and loan defaults cumulatively, based on the size of markets today and our expectations for market growth over time.

More importantly, we think the cycle will not look like 2008/09 in many regards. Not only is the leverage in very different places this time, but 2008 was unique in that it was very sharp, but also a very short default cycle. Defaults were very high in 2009, but the default cycle only lasted about two years, whereas in past cycles, defaults were elevated for closer to four years. We expect a longer cycle this time, where the default rate is not as high in the peak year as in 2009, but remains above average for a longer period of time. We also expect lower recovery rates in this cycle, especially in the loan market. Many of these factors could have important implications for pockets of credit markets (i.e., CLOs), and lead to different outcomes than what investors experienced the last time around.

# A Quick Look at Recent Default Trends

Before getting into our thoughts around defaults going forward, we take a quick step back and look at default trends over the past several years. Exhibit 2 shows issuer-weighted HY and loan default rates, and also par-weighted speculative grade default rates as a comparison. HY defaults troughed for the cycle in 2014 at around 1.4% issuer-weighted and 0.4% par-weighted. Defaults rose meaningfully in 2016 on the back of the Energy bust, peaking at 8.2% for HY issuer-weighted and 4.4% par-weighted. Loan defaults remained much lower in 2016 given much less Energy exposure, peaking in 2016 at about half the HY rate (4.1%). Defaults then began declining throughout much of 2017 as the Energy headwinds faded. More recently, default rates have slowed their descent, even starting to drift higher in some cases, such as the par-weighted speculative grade default rate and the loan issuer default rate. And the stabilization has happened at levels above 2014 default rates, the trough default year in this cycle.

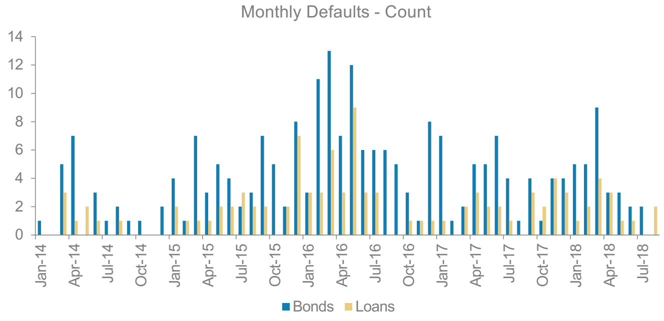
**Exhibit 2:** Par-weighted default rates have been inching higher; we expect default expectations to start rising in 2019



Source: Morgan Stanley Research, Moody's Investors Service

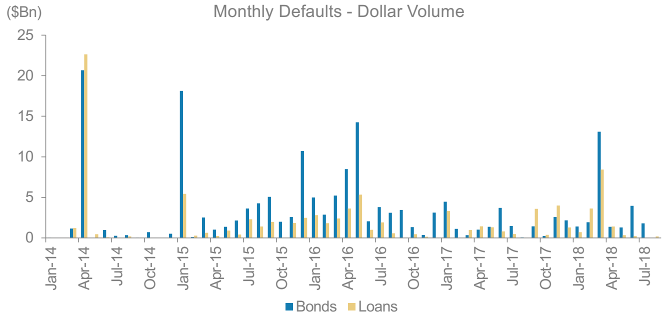
In Exhibit 3 and Exhibit 4, we show monthly defaults since the beginning of 2014, both by count and by volume. Defaults are clearly below peak 2016 levels, but the charts also show that monthly defaults are consistently running above trough 2014 levels. (Note, the big jump in par-weighted defaults in April 2014 is TXU, in January 2015 is CZR, and in March 2018 is IHRT.)

**Exhibit 3:** Defaults consistently running above 2014 lows...



Source: Morgan Stanley Research, Moody's Investors Service

**Exhibit 4:** ...and it's a similar story looking on a par-weighted basis



Source: Morgan Stanley Research, Moody's Investors Service

Comparing again to 2014, the cycle low point in defaults, in Exhibit 5 and Exhibit 6 we show defaults over the last 12 months and over the 12 months ending 12/31/14, broken out by count and volume, for bonds, loans, and all speculative grade issuers. Again, the tables show that the default count today is about twice what it was in 2014 for HY bonds, and over three times as large in loans. Defaults by par are also quite a bit larger today, if we remove the large one-off defaults in both years (TXU in 2014 and IHRT in 2018). And note, the story of elevated defaults today versus 2014 is not being driven by a single sector. Only one sector (Technology) has had fewer speculative grade defaults over the past 12 months versus over the 12 months ending 12/31/14. Energy, Consumer Discretionary, Consumer Staples, and Industrials are currently driving defaults by count.

Hence, we think the overall story when it comes to recent trends is that the default environment is still benign overall, but default risks are creeping higher versus past low default environments, consistent with many other late-cycle signals that have increasingly popped up this year.

**Exhibit 5:** Energy, Consumer, and Industrials are currently driving defaults by count

| | Bonds | | Loans | | SG | |
|---|---|---|---|---|---|---|
| **Sector** | **Count** | **Volume** | **Count** | **Volume** | **Count** | **Volume** |
| Materials | 4 | 1,307 | 2 | 311 | 4 | 1,618 |
| Industrials | 2 | 447 | 4 | 2,006 | 6 | 2,453 |
| Consumer Discretionary | 10 | 5,936 | 7 | 3,987 | 14 | 9,923 |
| Energy | 9 | 4,571 | 7 | 5,940 | 15 | 10,511 |
| Health Care | 1 | 3,217 | 1 | 495 | 2 | 3,712 |
| Consumer Staples | 5 | 1,825 | 4 | 1,765 | 8 | 3,590 |
| Utilities | 1 | 696 | 1 | 655 | 4 | 1,351 |
| Communications | 4 | 11,021 | 2 | 8,400 | 4 | 19,421 |
| Financials | 2 | 1,239 | 2 | 1,695 | 3 | 2,934 |
| Technology | 0 | - | 1 | 32 | 1 | 32 |
| **Total** | **42** | **31,287** | **26** | **24,185** | **59** | **55,472** |

Source: Morgan Stanley Research, Moody's Investors Service; Note: Totals shown are from Moody's reported aggregate data and may not sum precisely to our bottom-up sector-by-sector figures.

**Exhibit 6:** The speculative grade default count was lower in all sectors but Tech in 2014

| | Bonds | | Loans | | SG | |
|---|---|---|---|---|---|---|
| **Sector** | **Count** | **Volume** | **Count** | **Volume** | **Count** | **Volume** |
| Materials | 4 | 4,263 | 2 | 641 | 4 | 510 |
| Industrials | 3 | 632 | 2 | 363 | 5 | 2,032 |
| Consumer Discretionary | 3 | 1,176 | 2 | 230 | 5 | 8,827 |
| Energy | 5 | 1,428 | 2 | 146 | 5 | 221 |
| Health Care | 0 | - | 1 | 280 | 1 | 300 |
| Consumer Staples | 0 | - | 0 | - | 0 | - |
| Utilities | 3 | 16,593 | 1 | 22,636 | 4 | 331 |
| Communications | 2 | 210 | 2 | 433 | 4 | 650 |
| Financials | 3 | 630 | 1 | 11 | 3 | 720 |
| Technology | 6 | 1,887 | 3 | 1,266 | 7 | 1,877 |
| **Total** | **22** | **25,127** | **8** | **24,580** | **29** | **49,707** |

Source: Morgan Stanley Research, Moody's Investors Service; Note: Totals shown are from Moody's reported aggregate data and may not sum precisely to our bottom-up sector-by-sector figures.

Looking at defaults by type, in Exhibit 7 we show that about half the speculative grade defaults this year have come in the form of distressed exchanges, and half have been Chapter 11 bankruptcies.

**Exhibit 7:** Defaults split across distressed exchanges and bankruptcies

| | Count - SG | | | | |
|---|---|---|---|---|---|
| **Sector** | **Distressed Exchange** | **Ch 11** | **Missed Principal** | **Missed Cpn** | **Total** |
| Materials | 2 | 2 | 0 | - | **4** |
| Industrials | 4 | 2 | 0 | - | **6** |
| Consumer Discretionary | 5 | 8 | 0 | 1 | **14** |
| Energy | 8 | 3 | 1 | 3 | **15** |
| Health Care | 2 | - | 0 | - | **2** |
| Consumer Staples | 3 | 5 | 0 | - | **8** |
| Utilities | 0 | 4 | 0 | - | **4** |
| Communications | 1 | 1 | 0 | 2 | **4** |
| Financials | 1 | 2 | 0 | - | **3** |
| **Total** | **27** | **27** | **1** | **6** | **59** |

Source: Morgan Stanley Research, Moody's Investors Service; Note: Totals shown are from Moody's reported aggregate data and may not sum precisely to our bottom-up sector-by-sector figures.

# Short-Term Default Models

With these default trends in mind, in the following section we detail our methodologies to forecast defaults, first focusing on short-term (one-year) default rates.

We start with our top-down linear regression default model. To build this model, we began by running a step-wise process to select the variables that are most important in predicting the default rate. Without going into too much detail, the step-wise selection process allows variables to be added to or subtracted from the dataset based on a list of statistical tests such as the F test, T test, Akaike information criterion, and Bayesian information criterion. We found 10 potential variables after running this analysis.

Next, we excluded variables where the sign of the coefficient was not intuitive. We also excluded variables that did not meet the criteria using time series assumptions. Again, without getting into too much detail, we tested all possible factors along a few lines:

- Multicollinearity (variance inflation test)
- Autocorrelation (independent variables should not be auto-correlated to the residuals. Residuals should not be auto-correlated)
- Homoscedasticity (Breusch-Pagan test)

Our goal was to find factors that were able to satisfy the above criteria at a 90% confidence level and that also make intuitive sense to us. Putting all these constraints together, we ended up with the following four variables as model inputs, and transferred the Y variable using a Logit function.

- Net percentage of banks tightening standards for C&I loans (we use a binary flag instead of the actual number)
- VIX index (6-quarter moving average)
- Y/Y change of GDP growth rate
- 2s/10s yield curve

While these variables did not meet all of our requirements perfectly, they offered a good mix of statistical robustness and the ability to incorporate multiple inputs without overfitting the model.

**Exhibit 8:** Our HY bond issuer-weighted default model

| | Forecasted Level (Q4 2019) |
|---|---|
| Net Percentage of Banks Tightening Standards for C&I Loans (flag*) | (still easing) |
| VIX Index Six Quarter Moving Average | 19.4 (higher y/y) |
| GDP Growth Rate | 2.0% (lower y/y) |
| 2s/10s Yield Curve | 0 (flatter y/y) |

Source: Morgan Stanley Research; *Flag is binary: 1 if banks are easing lending standards and 0 if banks are tightening lending standards.

Over the next year, we make assumptions about the independent variables, some of which are driven by research forecasts, whereas others are our own subjective views. Our forecasts call for GDP growth to slow from around 3.0% in 2018 to ~2.0% in 2019. We assume that the trailing 6Q VIX average moves higher, to 19.4, from current levels in the 13-14 range, consistent with the rise in volatility that we often see in late-cycle environments. To be conservative, we assume that banks keep loosening lending standards through next year (at a slower rate). To the extent banks begin tightening lending standards later in the year, which we see as a reasonable possibility, there would be upside risks to our default forecast. Finally, we incorporate our interest rate strategists' view for a fully flat Treasury curve in 2019.

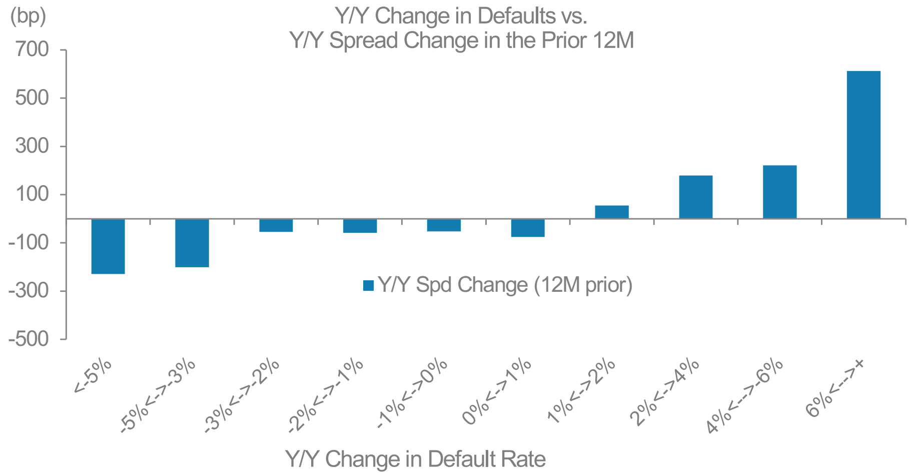
Using these inputs, our model gives us a HY bond issuer-weighted default rate of 3.3% over the next year. Note, we run similar models for speculative grade par-weighted defaults and for leveraged loans as well. While our preliminary 2019 HY default forecast of 3.3% is down from the current HY issuer-weighted default rate of 4.3%, we assume a 2.9% speculative grade par-weighted default rate for next year, and a 2.7% loan default rate, both up from current levels.

In addition, as a "second opinion" to that of our multi-factor macro model, we also use a more bottom-up regression model based upon different levels of distress in the HY market (e.g., credits trading at 1,000-2,000bp and 2,000bp+) and how many of those credits we can expect to default in one year based on historical relationships. Using this approach, we get to a default rate of 2.62% for the broad HY market.

# Longer-Term Default Rates

While one-year default forecasts are necessary as a part of any outlook process, we have always argued that they are not that useful in predicting the near-term direction of the market, mainly because spreads move before defaults. In other words, the default rate in 2019 was likely already priced into the market in 2018. What matters most in our view is when defaults will begin inflecting higher more notably. If that is 2020, as an example, credit markets will begin to price it in next year. As we show below, when the HY default rate increases by over 2% vs. the prior year, in that prior year, spreads widen materially, on average.

**Exhibit 9:** Spreads in given year are most impacted by the change in defaults the following year



Source: Morgan Stanley Research, FTSE Fixed Income LLC, Moody's Investors Service

Before getting into the "when" in more detail (i.e., how to think about timing the inflection in defaults), in the next section we dig into longer-term default rates, specifically what defaults could look like over the course of the default cycle, not just over a one-year period.

In the past, we have estimated longer-term cumulative defaults by comparing the fundamental credit quality of the HY index today relative to previous cycles. Specifically, we have looked at the size of the "tail" in the market and how it has evolved over time, noting that about two-thirds of defaults in a credit cycle are derived from companies that begin in the "tail" (see: Making Heads of the Tail, 1.14.2016, for our original work on this topic). The drawback of using this framework, especially for the leveraged loan market, is that many companies do not have publically available leverage data, and hence have to be excluded from our analysis.

Using a more basic approach, but which captures both public and private companies, in Exhibit 10 we very simply apply historical 5Y cumulative default rates in the past three default cycles (taking the worst 5Y cohort in each cycle – typically right when defaults began rising), to the ratings distribution of the HY and loan markets today. We assume that this will be a roughly average default cycle, more severe than 2008 (which was actually the mildest of the past three when measured based on 5Y default rates), but less severe than the early 1990s or early 2000s. Of course, this assumes the credit quality of the market does not deteriorate further before the default cycle gets going. Based on this analysis, we get to a 5Y HY default rate of 25.0% and a 5Y leveraged loan default rate of 24.2%, again cumulatively over the next cycle.

**Exhibit 10:** Based on the ratings breakdown of the market today, we get to a 5Y cumulative HY and loan default rate of 25.0% and 24.2%, respectively, over the next default cycle

| | Historical 5Y Cum. Default Rates | | | Ratings Breakdown | |
|---|---|---|---|---|---|
| **Rating** | **1989** | **1999** | **2008** | **HY** | **Loans** |
| **Aaa** | 0.0% | 0.0% | 0.0% | | |
| **Aa** | 0.5% | 0.0% | 1.4% | | |
| **A** | 0.8% | 0.7% | 1.8% | | 0.0% |
| **Baa** | 4.7% | 3.0% | 2.2% | | 11.8% |
| **Ba** | 22.7% | 10.7% | 8.5% | 49.2% | 30.0% |
| **B** | 37.9% | 36.5% | 22.0% | 39.2% | 52.1% |
| **Caa-C** | 55.4% | 47.8% | 40.9% | 11.5% | 6.1% |
| **All SG** | **30.8%** | **29.1%** | **23.3%** | **100.0%** | **100.0%** |

Source: Morgan Stanley Research, FTSE Fixed Income LLC, S&P LCD

Taking this analysis one step further, in Exhibit 11 we model these 5Y cumulative default rates, spread out over five years, based roughly on what we think the next default cycle could look like. We also make assumptions about the growth in the market over those five years through net issuance, downgrades, and defaults, so we can show total default volumes. For example, over the five-year period, with our assumptions, we get to ~$700bn in US HY and loan defaults cumulatively.

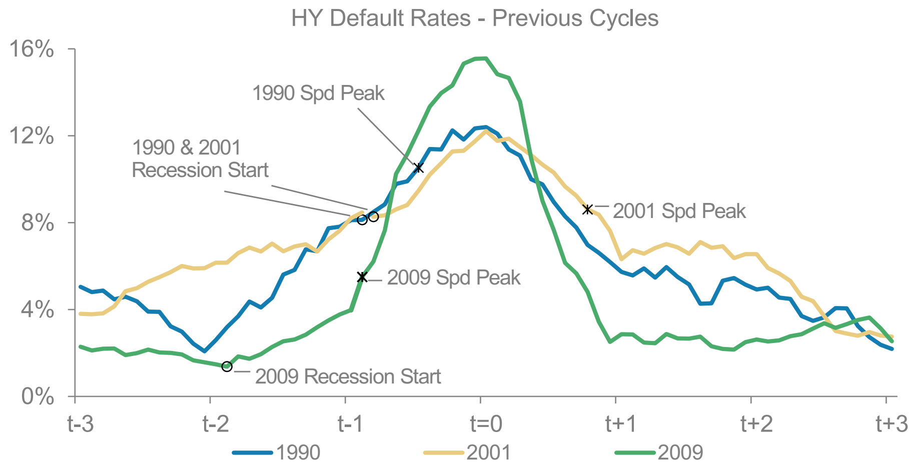
**Exhibit 11:** We assume a longer default cycle, but a less extreme default rate (versus 2009) in the peak default year

| | Default Cycle (Years) | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| *BB Default rate* | 0.8% | 1.5% | 2.0% | 1.9% | 0.9% |
| *B Default rate* | 5.5% | 7.0% | 9.5% | 8.2% | 3.0% |
| *CCC Default rate* | 12.0% | 19.0% | 27.0% | 21.0% | 7.0% |
| *HY Default rate* | 4.0% | 5.9% | 9.2% | 6.5% | 2.3% |
| *Loan Default rate* | 3.8% | 5.2% | 9.3% | 6.9% | 1.5% |
| **Cumulative HY Defaults** | **50** | **126** | **244** | **336** | **373** |
| **Cumulative loan Defaults** | **41** | **105** | **232** | **318** | **337** |
| Total HY Market at end of year | 1,292 | 1,283 | 1,422 | 1,626 | 1,741 |
| Total Loan Market at end of year | 1,227 | 1,356 | 1,252 | 1,212 | 1,264 |

Source: Morgan Stanley Research, Moody's Investors Service, S&P LCD, FTSE Fixed Income LLC; Note: This table shows roughly what we think default rates could look like over the course of the next default cycle, but does not make an assumption on specifically when that default cycle will begin.

Our key assumption is that the next default cycle will be longer than the last one, but not as extreme in the peak default year. And as we show in Exhibit 12, this type of a cycle, where defaults remain above average for 3-4 years (not 1-2 years like in 2008/09), but do not hit such a high level in any given year, is actually somewhat normal. In fact, a short, sharp cycle like in 2008/09 is really more of an anomaly.

**Exhibit 12:** The 2008/09 cycle was actually unique in that it was very sharp, but did not last very long

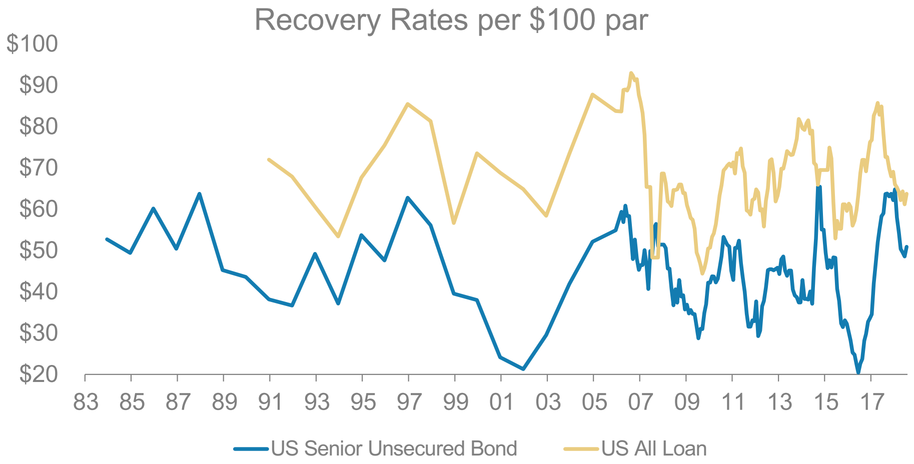


Source: Morgan Stanley Research, Moody's Investors Service, Citigroup Index LLC; Note: Assumes US bond issuer default rates for 2001, 2009, and current. Assumes US speculative grade default rate (reflects bonds and loans) for 1990. T=0 is the peak default year in that cycle.

Why could this one last longer? First, unlike in the last downturn, the leverage this time around is not in the financial system, but sitting on non-financial balance sheets (like in the late 1990s), which will likely not translate to a systemic crisis and may not coincide with a deep recession, but could take longer to work through. Second, the fact that policy-makers may not have the same tools to deal with a downturn may mean that the recovery for credit markets is not as quick as it was coming out of the crisis. For example, we may enter a downturn with rates still at historically low levels, with very large central bank balance sheets, and a more difficult time enacting further fiscal stimulus after recent tax cuts. Third, we think various fundamental factors, such as the prevalence of cov-lite loans and low interest rates, will not make overall default volumes lower, but may mean defaults take longer to materialize.

Additionally, while we will save a deeper dive on recovery rates for another report, as we have discussed in the past, we expect lower recovery rates next time around, especially for leveraged loans. The long-term average senior unsecured recovery rate is 45% and for loans the average is closer to 70%, though recovery rates tend to be negatively correlated with defaults (lower in high default environments).

**Exhibit 13:** Recovery rates are lowest when defaults are high, like in 2001, 2009, and 2016

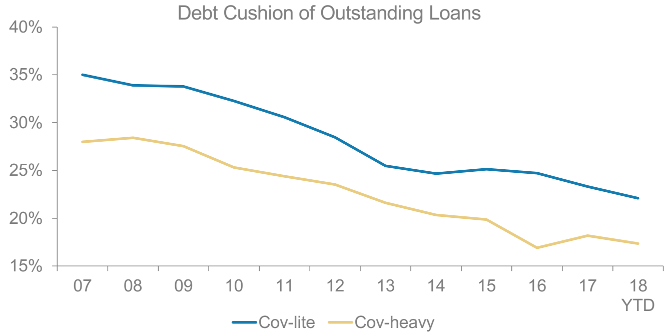


Source: Morgan Stanley Research, Moody's Investors Service

We think loan recovery rates will fall in the 50-60% range in the next cycle, below long-term averages for the following reasons:

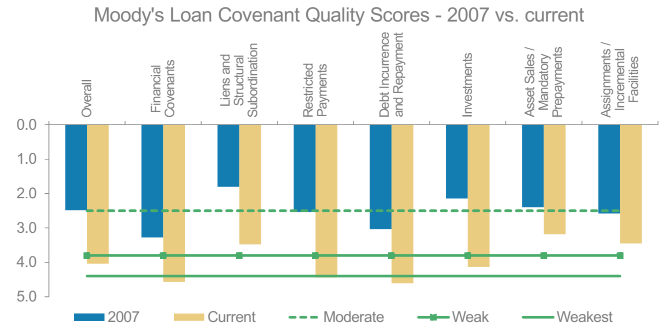
- Leverage levels have consistently risen in this cycle, especially first lien leverage, and those leverage levels have become more “optimistic” with larger and larger EBITDA adjustments.
- The debt cushion beneath the average loan has gotten smaller all cycle, which should directly translate into higher loan losses in the event of default, with an increasing prevalence of loan-only deals.
- Cov-lite means issuers have an easier time "kicking the can down the road," which worked in 2008 because it was such a short cycle. But in a longer default cycle, companies may kick the can for a while, but then eventually default, and in that case, recovery rates should be lower than if the company had defaulted sooner. Additionally, weak covenant protection goes beyond the traditional cov-lite definition. As Moody’s describes, “structuring credit agreements to allow borrowers to make collateral stripping asset-transfers, issue dilutive incremental first-lien loans, and retain an increased portion of asset-sale proceeds effectively reduces collateral support. All of these actions can weaken the position of current first-lien claims.” (Moody’s Investors Service, “Convergence of bonds and loans sets stage for worse recoveries in the next downturn,” 08.16.2018.)
- Distressed exchanges can bias recovery rates higher, but again, a distressed exchange often just buys time. In a longer cycle, many of these distressed exchanges may end up re-defaulting with lower recovery rates.

**Exhibit 14:** A smaller debt cushion should translate to lower loan recovery rates



Source: Morgan Stanley Research, S&P LCD

**Exhibit 15:** Loan covenant protection is weaker across all categories



Source: Morgan Stanley Research, Moody's Investors Service

# Timing the Cycle

Of course, there's the million-dollar question we need to try to answer: When will defaults start rising more materially? In our view, defaults will drift higher in 2019, and likely rise more significantly in 2020 (which markets should price in a year ahead of time), as monetary policy becomes restrictive and growth potentially slows more materially. Is there a way we can be more scientific about that timing?

While there is no perfect way of doing it, as some of the timing simply depends on when growth starts to turn, to try to think about it a bit more precisely, in Exhibit 16 we show 10 factors that have historically led default waves. Typically before defaults peak, the 2s/10s curve flattens or inverts, the Fed finishes its hiking cycle, the labor market is tight, monetary policy is restrictive, financial conditions are tightening, and corporate debt/GDP, M&A, margins, earnings growth, and key macro variables have peaked. Below, we show the typical lag between when these factors historically trigger the signal (peak or trough) and when defaults subsequently peak. For example, in the past it has taken 28 months on average from when the fed funds rate peaked to when defaults peak for the cycle. We note in the Exhibit when the indicator has peaked or troughed (if it has already) or when it will peak/trough based on our macro forecasts or our own subjective views. Taking the average lag between when each indicator has triggered in the past and when defaults have peaked, and applying to the current cycle, implies a default peak this time in early 2021. Again, while it is difficult to be too precise, we think these results are reasonable based on where markets may be in this cycle, and how long it can take for a default cycle to play out.

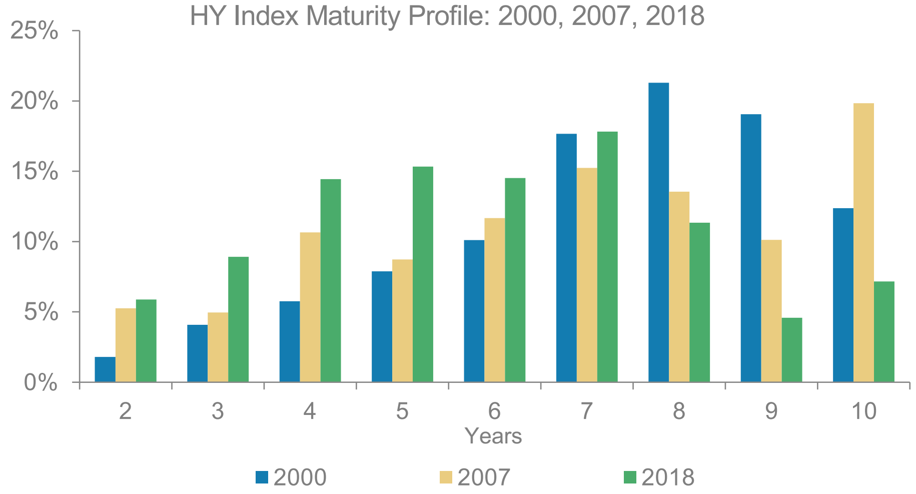
**Exhibit 16:** Assessing when defaults could peak using a variety of cycle indicators

| Factor | Signal | Average Lag to Next Default Peak (Months) | Date of Signal | Implied Default Peak |
|---|---|---:|---:|---:|
| 2s10s Curve | Trough | 28 | 6/30/2019 | 10/30/2021 |
| Fed Funds Rate | Peak | 28 | 6/19/2019 | 10/19/2021 |
| Corporate Debt / GDP | Peak | 9 | 3/31/2019 | 12/31/2019 |
| M&A Volume (12M MA) | Peak | 22 | 7/31/2018 | 5/31/2020 |
| Corporate Net Margins | Peak | 23 | 9/30/2018 | 8/30/2020 |
| S&P500 Earnings Growth | Peak | 34 | 9/30/2018 | 7/30/2021 |
| Financial Conditions | Trough | 25 | 1/26/2018 | 2/26/2020 |
| US Real Rate - Natural Rate | Cross to > 0 | 37 | 6/30/2019 | 7/30/2022 |
| Unemployment less NAIRU | Cross to < 0 | 49 | 3/31/2017 | 4/30/2021 |
| ISM Manufacturing PMI | Peak | 34 | 8/31/2018 | 6/30/2021 |
| **Average** | | **28** | | **3/8/2021** |

Source: Morgan Stanley Research, Citigroup Index LLC, Bloomberg; Note: Debt/GDP is at peak levels compared to past cycles, but we assume it rises for another 9 months. We use forecast values where available from our macro team, for example for the 2s/10s curve, and real rate – natural rate to determine when the variable may peak/trough. We assume earnings growth, margins, and PMIs are peaking right about now. In determining when the signal triggered in past cycles, we use the last local peak/trough when there are several peaks/troughs.

As a sidenote, investors often bring up a backdated maturity wall when arguing that near-term default risks are low. We don't rely too much on this metric in our analysis, simply because the maturity wall is almost always backdated at the end of a bull market. Almost by definition, during a bull market, credit markets are wide open, allowing companies to term out debt. In fact, as Exhibit 17 shows, the maturity profile of the market is less backdated today than it was in 2000 or 2007, before those default cycles began. What we think matters most for investors is when credit conditions begin tightening materially. When that happens, credit markets will price in defaults fairly quickly, even if it takes a year or two for companies to hit their breaking point, and hence, for the defaults to materialize.

**Exhibit 17:** The maturity profile is always backdated at the end of a bull market – if anything it is more front-loaded today than in 2000 or 2007



Source: Morgan Stanley Research, Citigroup Index LLC, Bloomberg; Note: 2000, 2007 and 2018 are year zero. We do not show year 1, as our indices don't include debt maturing in under a year. But we think it is safe to assume that maturities in the next 12 months are typically quite low.

# Which Sectors Are Most at Risk?

Moving beyond timing, we next walk through the sectors that we think could be most at risk when the cycle turns. When screening for problem sectors down the line, we focus on two main metrics. First, historically we find that sectors which account for the biggest share of debt growth in the bull market often have the biggest problems when the cycle turns. This would have pointed to Telecom in the late 1990s and Energy in 2014. Along these lines, we show sectors that have increased their share of index debt outstanding in this cycle the most in both HY and in the loan market.

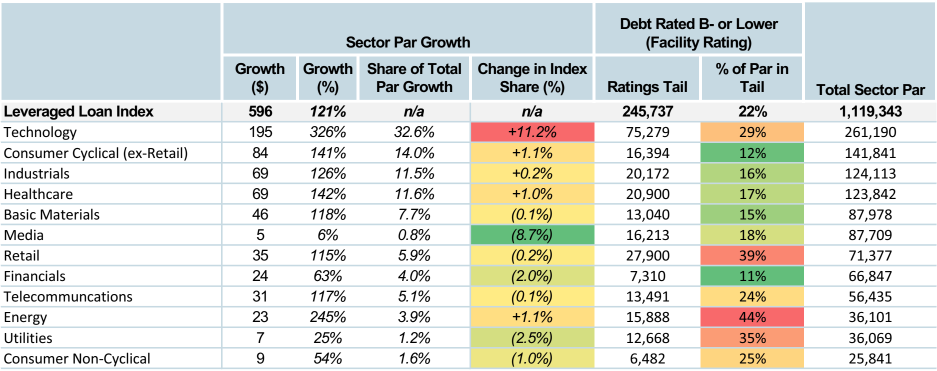
Second, companies that account for the largest share of highly levered debt typically drive defaults when the cycle turns. As noted above, screening based on leverage limits us to companies with publically available data. Hence, to avoid this issue, we simply show sectors with the largest percentage of debt rated B- or lower.

We also show the size of each sector, as some industries may look bad according to these metrics, but may be very small, and hence not represent a big issue for the market in aggregate. As a sidenote, though it almost goes without saying, other factors that are tougher to capture in a framework like this will also influence defaults when the cycle turns, such as secular risks (i.e., those most exposed to tech disruption) and/or high degrees of cyclicality.

As an example, in the loan market, Tech (which includes business services) stands out as the biggest risk, increasing its index share significantly in this cycle, with 29% of debt B- or lower, and the biggest sector in the index. Retail is also a risk, with 39% of debt B- or lower. Consumer Cyclicals (ex-Retail) and Healthcare also stand out, accounting for 14% and 11.6% of the growth in the leveraged loan index in this cycle, respectively, and are both large sectors.

In the HY market, Healthcare and Retail also stand out given a high percentage of levered/low-rated debt (though Retail is a small HY sector). Consumer Non-Cyclicals, Healthcare, and Tech have accounted for a disproportionate share of HY growth in this cycle, although Tech is much smaller as a percentage of the HY market versus its size as a percentage of the loan market. Telecom is in the middle of the pack on these metrics, but we would include it in the list of "at-risk" sectors, given the specific secular challenges that the industry is facing. Energy and Basic Materials have clearly driven significant growth in the HY market in this cycle, but we are less concerned about those sectors, as they already had a bit of a washout in the mini-default wave of 2015/16.

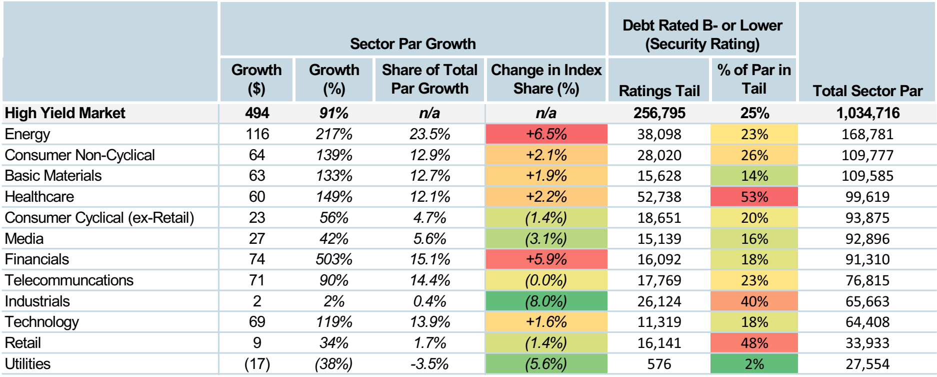
**Exhibit 18:** In the leveraged loan market, Tech screens as the sector most at risk down the line, with Retail, Consumer Cyclicals (ex-Retail) and Healthcare also on the list



| | Sector Par Growth | | | | Debt Rated B- or Lower (Facility Rating) | | |
|---|---|---|---|---|---|---|---|
| | Growth ($) | Growth (%) | Share of Total Par Growth | Change in Index Share (%) | Ratings Tail | % of Par in Tail | Total Sector Par |
| **Leveraged Loan Index** | **596** | ***121%*** | ***n/a*** | ***n/a*** | **245,737** | **22%** | **1,119,343** |
| Technology | 195 | *326%* | *32.6%* | *+11.2%* | 75,279 | 29% | 261,190 |
| Consumer Cyclical (ex-Retail) | 84 | *141%* | *14.0%* | *+1.1%* | 16,394 | 12% | 141,841 |
| Industrials | 69 | *126%* | *11.5%* | *+0.2%* | 20,172 | 16% | 124,113 |
| Healthcare | 69 | *142%* | *11.6%* | *+1.0%* | 20,900 | 17% | 123,842 |
| Basic Materials | 46 | *118%* | *7.7%* | *(0.1%)* | 13,040 | 15% | 87,978 |
| Media | 5 | *6%* | *0.8%* | *(8.7%)* | 16,213 | 18% | 87,709 |
| Retail | 35 | *115%* | *5.9%* | *(0.2%)* | 27,900 | 39% | 71,377 |
| Financials | 24 | *63%* | *4.0%* | *(2.0%)* | 7,310 | 11% | 66,847 |
| Telecommuncations | 31 | *117%* | *5.1%* | *(0.1%)* | 13,491 | 24% | 56,435 |
| Energy | 23 | *245%* | *3.9%* | *+1.1%* | 15,888 | 44% | 36,101 |
| Utilities | 7 | *25%* | *1.2%* | *(2.5%)* | 12,668 | 35% | 36,069 |
| Consumer Non-Cyclical | 9 | *54%* | *1.6%* | *(1.0%)* | 6,482 | 25% | 25,841 |

Source: Morgan Stanley Research, S&P LCD

**Exhibit 19:** In HY, we are more concerned about Retail, Healthcare, Consumer Non-Cyclicals, and Telecom



| | Sector Par Growth | | | | Debt Rated B- or Lower (Security Rating) | | |
|---|---|---|---|---|---|---|---|
| | Growth ($) | Growth (%) | Share of Total Par Growth | Change in Index Share (%) | Ratings Tail | % of Par in Tail | Total Sector Par |
| **High Yield Market** | **494** | ***91%*** | ***n/a*** | ***n/a*** | **256,795** | **25%** | **1,034,716** |
| Energy | 116 | *217%* | *23.5%* | *+6.5%* | 38,098 | 23% | 168,781 |
| Consumer Non-Cyclical | 64 | *139%* | *12.9%* | *+2.1%* | 28,020 | 26% | 109,777 |
| Basic Materials | 63 | *133%* | *12.7%* | *+1.9%* | 15,628 | 14% | 109,585 |
| Healthcare | 60 | *149%* | *12.1%* | *+2.2%* | 52,738 | 53% | 99,619 |
| Consumer Cyclical (ex-Retail) | 23 | *56%* | *4.7%* | *(1.4%)* | 18,651 | 20% | 93,875 |
| Media | 27 | *42%* | *5.6%* | *(3.1%)* | 15,139 | 16% | 92,896 |
| Financials | 74 | *503%* | *15.1%* | *+5.9%* | 16,092 | 18% | 91,310 |
| Telecommuncations | 71 | *90%* | *14.4%* | *(0.0%)* | 17,769 | 23% | 76,815 |
| Industrials | 2 | *2%* | *0.4%* | *(8.0%)* | 26,124 | 40% | 65,663 |
| Technology | 69 | *119%* | *13.9%* | *+1.6%* | 11,319 | 18% | 64,408 |
| Retail | 9 | *34%* | *1.7%* | *(1.4%)* | 16,141 | 48% | 33,933 |
| Utilities | (17) | *(38%)* | *-3.5%* | *(5.6%)* | 576 | 2% | 27,554 |

Source: Morgan Stanley Research, FTSE Fixed Income LLC

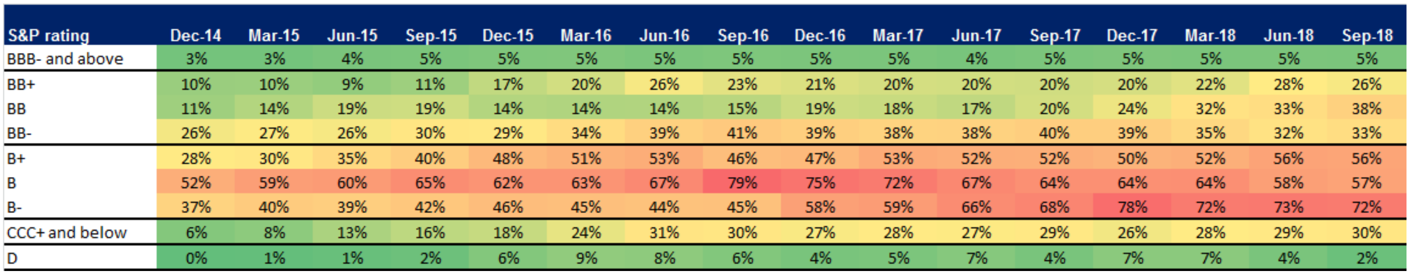
# How Does CLO Collateral Stack Up?

A default cycle of this magnitude and shape would not be good for junior mezzanine tranches and equity. While it is now well known that CLO equity performed well in the aftermath of the great financial crisis (see Revisiting Lessons from the Financial Crisis, February 26, 2016), it is important to highlight the reasons for their outperformance, and why such outperformance would be unlikely in the scenario above. In the last cycle, defaults not only spiked in just a few quarters but also came down quickly thanks to the many unorthodox policies that were directed at markets at large. As a result, while a large portion of CLO equity tranches were shut off from distributions following the breach of the junior OC tests, they did not stay breached for long. Thanks to the speed of the recovery in the loan markets, the breached junior OC test cured rather quickly and the cash flows to equity and junior mezzanine tranches resumed. In a scenario where defaults stay elevated over a prolonged period, as envisaged above, deals that experience trigger breaches will stay breached for longer, with negative implications for equity and junior mezzanine tranche performance.

Secondary to the overall impact, defaults in CLOs would vary with the collateral compositions. We therefore quickly compare ratings and sector exposures across the S&P LCD Leveraged Loan Index (LLI) and CLO collateral, and also describe loan obligor diversification and overlap in the CLO space.

CLOs have a higher proportion of single-B collateral than the loan market, but indenture ratings constraints could keep CLO collateral ratings in check as loan market downgrades pick up in a default cycle. CLOs are underweight the higher-risk Healthcare and Consumer Cyclicals (ex-Retail) sectors, but overweight Tech. CLO loan diversification limits the dollar exposure by defaulting obligor, but high deal-by-deal overlap instead means spillover across the space.

**Exhibit 20:** Historical CLO ownership of the leveraged loan index by rating bucket



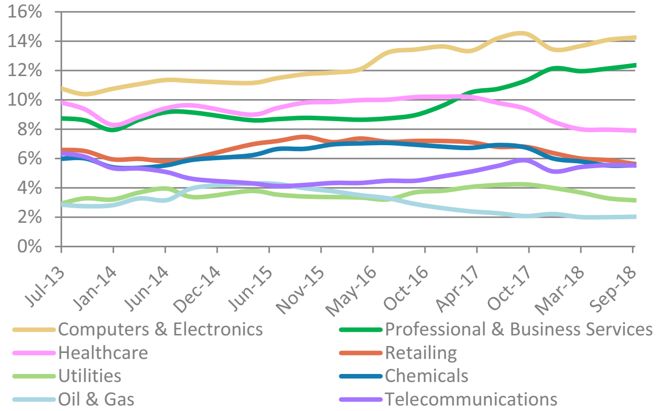
| S&P rating | Dec-14 | Mar-15 | Jun-15 | Sep-15 | Dec-15 | Mar-16 | Jun-16 | Sep-16 | Dec-16 | Mar-17 | Jun-17 | Sep-17 | Dec-17 | Mar-18 | Jun-18 | Sep-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBB- and above | 3% | 3% | 4% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 4% | 5% | 5% | 5% | 5% | 5% |
| BB+ | 10% | 10% | 9% | 11% | 17% | 20% | 26% | 23% | 21% | 20% | 20% | 20% | 20% | 22% | 28% | 26% |
| BB | 11% | 14% | 19% | 19% | 14% | 14% | 14% | 15% | 19% | 18% | 17% | 20% | 24% | 32% | 33% | 38% |
| BB- | 26% | 27% | 26% | 30% | 29% | 34% | 39% | 41% | 39% | 38% | 38% | 40% | 39% | 35% | 32% | 33% |
| B+ | 28% | 30% | 35% | 40% | 48% | 51% | 53% | 46% | 47% | 53% | 52% | 52% | 50% | 52% | 56% | 56% |
| B | 52% | 59% | 60% | 65% | 62% | 63% | 67% | 79% | 75% | 72% | 67% | 64% | 64% | 64% | 58% | 57% |
| B- | 37% | 40% | 39% | 42% | 46% | 45% | 44% | 45% | 58% | 59% | 66% | 68% | 78% | 72% | 73% | 72% |
| CCC+ and below | 6% | 8% | 13% | 16% | 18% | 24% | 31% | 30% | 27% | 28% | 27% | 29% | 26% | 28% | 29% | 30% |
| D | 0% | 1% | 1% | 2% | 6% | 9% | 8% | 6% | 4% | 5% | 7% | 4% | 7% | 7% | 4% | 2% |

Source: Morgan Stanley Research, S&P LCD, Intex

**Ratings splits:** CLO WARF constraints in combination with WAS targets and diversification requirements have pushed CLOs into a limited ratings profile. Exhibit 20 shows how the CLO ownership of the LLI has increased over time, with intensifying demand pressure on single-B rated loans, and B- rated loans in particular. Combining the default expectations above with the current ratings breakdown in each of the LLI and CLO collateral, the ratings-implied defaults would be slightly higher for the 21%/68%/4% BB/B/CCC rated CLO collateral versus the modestly better-rated LLI. As net downgrades in the default cycle worsen, the loan market ratings composition, CLO ratings constraints and active portfolio rebalancings may eventually lead to a relatively better CLO collateral ratings composition, with lower CLO collateral defaults.

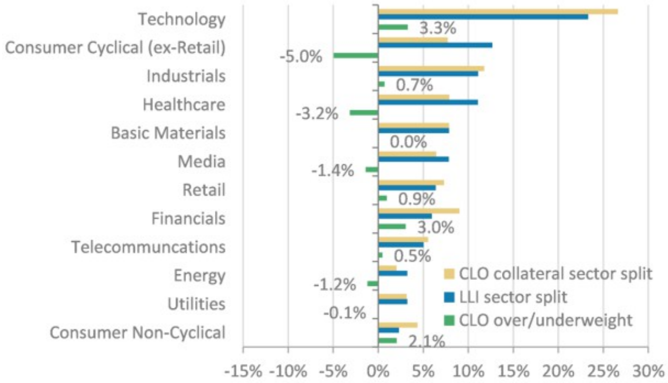
**CLO sector over- and underweights:** CLOs have been known to collectively over- or underweight certain sectors, with the trends to less Oil & Gas, Retailing and Healthcare loans standing out as clear examples (Exhibit 21, and see the Global CLO Manager Factbook: 3Q18 Edition for more CLO sector trends). Mapping CLO collateral sector exposures to broader sector categories, we show sector differences with the loan market in Exhibit 22. CLOs in aggregate look more exposed to Tech, but less exposed to Consumer Cyclicals (ex-Retail) and Healthcare, higher-risk sectors noted in Exhibit 18.

**Exhibit 21:** CLO sector composition over time



Source: Morgan Stanley Research, Intex, Moody's

**Exhibit 22:** Comparison of sector composition between the LLI and CLO collateral

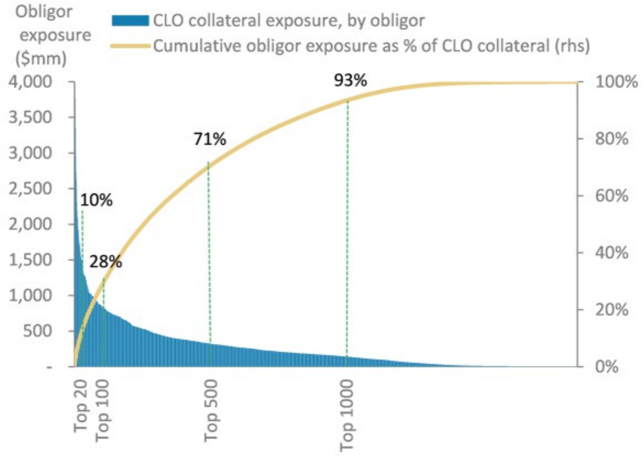


Source: Morgan Stanley Research, Intex, S&P LCD

**CLO collateral diversification:** Loan defaults in CLOs are only as impactful as the CLOs' dollar exposure to any defaulting obligors, haircut for recovery rates. Diversification is an important focus of CLOs, through both the CLO obligor limitations and the sector-dependent diversity score in the asset quality matrix. The CLO obligor exposures in Exhibit 23 show how 10% of aggregate CLO collateral is invested across the top 20 obligors, and another 18% in the next 80 largest obligors. These obligors can be found on average in 670 and 422 CLOs, respectively. Across the CLO deal space, there are on average 218 obligors per deal, if obligor exposures accounting for less than 0.1% of total exposure (on average 32 obligors) are excluded.

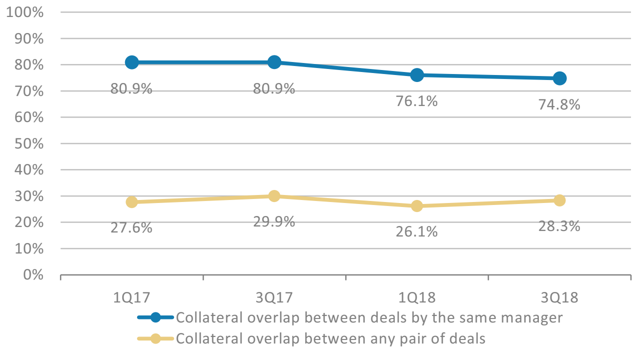
The flipside of CLO loan diversification is the notable CLO collateral overlap between deals in the space. Exhibit 24 shows how collateral overlap has been evolving over time. The intra-manager collateral overlap (average deal overlap between deals managed by the same manager) has recently softened by ~6pp from 80.9% to 74.8% thanks to a growing loan space and increasing CLO franchises, but the deal-by-deal overlap has remained around 28% on average. The CMBS conduit space, as a comparison, only has a 6.5% deal-by-deal overlap.

**Exhibit 23:** Cumulative CLO collateral exposure to obligors by ranking



Source: Morgan Stanley Research, Intex

**Exhibit 24:** US CLO collateral overlap between each manager's own deals and between any pair of deals



Source: Morgan Stanley Research, Intex

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(as of September 30, 2018)

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|  | COVERAGE UNIVERSE |  | INVESTMENT BANKING CLIENTS (IBC) |  |  | OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC) |  |
|---|---|---|---|---|---|---|---|
| STOCK RATING CATEGORY | COUNT | % OF TOTAL | COUNT | % OF TOTAL IBC | % OF RATING CATEGORY | COUNT | % OF TOTAL OTHER MISC |
| **Overweight/Buy** | **1178** | **37%** | **308** | **42%** | **26%** | **562** | **40%** |
| **Equal-weight/Hold** | **1378** | **44%** | **343** | **46%** | **25%** | **625** | **44%** |
| **Not-Rated/Hold** | **49** | **2%** | **5** | **1%** | **10%** | **7** | **0%** |
| **Underweight/Sell** | **554** | **18%** | **83** | **11%** | **15%** | **224** | **16%** |
| **TOTAL** | **3,159** |  | **739** |  |  | **1418** |  |

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