MOODY'S ANALYTICS

U.S. MIDDLE MARKET RISK REPORT

Contributors

Lin Moon
Assistant Director, Research Analyst
Data Intelligence Solutions
Lin.Moon@Moodys.com
+1.415.874.6167

Stephanie Yu
Assistant Director, Research Analyst
Data Intelligence Solutions
Stephanie.Yu@Moodys.com
+1.415.874.6191

Irina Korablev
Senior Director
Data Intelligence Solutions
Irina.Korablev@Moodys.com
+1.415.874.6278

Private Firm Summary

Report Date: November 2017 (data as of June 2017)

This semiannual report examines credit risk in the otherwise opaque U.S. private firm credit market. We report trends in five different areas of risk measurement: realized defaults, internal bank ratings, new originations, financial statement-based information, and model-based risk estimates. We derive the statistics in this report from Moody's Analytics Credit Research Database (CRD®).

This report contains EDF™ (Expected Default Frequency) values calculated using the RiskCalc™ U.S. 4.0 Corporate Model. The stressed EDF measure is calculated using the RiskCalc Plus Stress Testing Model, ratio-based approach. The model adjusts a company's financial statements depending on how various statement inputs behave under different stress scenarios to calculate pro-forma FSO EDF values. The model also estimates stressed credit cycle signals under different scenarios. Combining the *pro forma* FSO EDF measure with the stressed credit cycle factors leads to a meaningful quarterly stressed EDF measure.

Highlights

» Private firm default rates have declined steadily during the past five years. At 1.5%, the rolling 12-month default rate is down 73% from its September 2009 peak of 5.3% (Figure 1). This trend has been driven primarily by a decline in the charge-off rate, now at its lowest level in the past ten years. In addition, the rate of borrowers in non-accrual status has decreased 53% since September 2009. The number of borrowers rated "Substandard" has seen a steady increase since the first quarter of 2015, above pre-crisis levels, reflecting banks' cautious lending practices (Figure 2).

» Banks downgraded 17% of borrowers on their internal rating scales during the past year, compared to 15% in 2016 (Figure 7). This finding suggests caution in bank lending practices.

» *Mining, Oil & Gas* showed the highest percentage of balances adversely rated in 2017, 45%. *Agriculture & Hunting* and *Wholesale* follow at 19% and 13%, respectively (Figure 6). Across all industries, except *Mining, Oil & Gas*, the percentage of balances adversely rated remained relatively unchanged during the past year.

» New originations for C&I loans have climbed steadily since the financial crisis, reaching a new high in Q3 2015 (Figure 9). However, the origination pace has slowed during recent quarters, and certain industries have been exceptionally volatile due to falling commodity prices, such as *Mining, Oil & Gas* (Fig. 10).

» The median RiskCalc 4.0 CCA EDF value for the U.S. bottomed at 0.5% in August 2014, increased to 0.8% in December 2016, and has fallen back to 0.6% as of June 2017 (Figure 11). The median CCA EDF value for Non-Pass borrowers decreased from 2.6% in December 2016 to 2.4% in June 2017 (Figure 12).

» Borrowers' financial ratio medians generally improved in 2016. *Debt Coverage* is at its highest level in more than ten years. *Leverage*, as measured by retained earning**s** over current liabilities**,** has continued to improve over the past decade. *Sales Growth* and *Change in ROA*, despite slowing in 2016, have both remained positive after the financial crisis, indicating steady growth for borrowers. The median borrower *size* has risen every year since 2012, indicating banks' preference for lending to larger borrowers, though the high value in 2016 is due to the timing of financial statements filing and will likely revert to trend once banks collect smaller borrowers' financial statements. We also observe rising *Inventory to Sales* and *Current Liabilities to Sales* ratios, while *Liquidity* and *ROA* ratios have remained steady.

» The industries with the greatest risk in June 2017, as measured by RiskCalc CCA EDF credit measures, were *Mining, Oil & Gas*, *Information & Culture*, and *Real Estate & Leasing* (Figure 16). However, the average EDF value for *Mining, Oil & Gas* decreased by 16% over the past year as oil prices stabilized. Transportation showed the largest EDF value increase, climbing 20% year-over-year (Figure 17).

» The median FSO EDF value of vintage loans, grouped by year of origination, has declined steadily over the past decade. This finding indicates an improving overall credit risk profile for middle market portfolios and tighter lending standards (Figure 14).

» Among the ten states showcasing the largest change in EDF levels during the past ten years, Oklahoma, Texas, and New Mexico experienced significant increases (Figure 20). All 50 states' median CCA EDF measures have fallen since June 2009. EDF values have declined in most states during the past year, although Montana and Texas saw EDF value increases of 25% and 20%, respectively (Figure 22).

Table of Contents

Overview

Introduction

This report uses realized default information, bank risk ratings, financial statement data, and RiskCalc Credit Cycle Adjusted (CCA) private firm EDF credit measures to provide insights into a market where data is otherwise unavailable. Data comes from the Moody's Analytics Credit Research Database (CRD). The CRD collects quarterly data from 23 U.S. lending organizations, including large institutions as well as smaller regional banks. The breadth and depth of the CRD make the data highly representative of the U.S. credit market. The CRD actively works with each institution to ensure a complete and thorough understanding of loan accounting and financial statement data. The CRD captures defaults in a consistent and accurate manner using information from each institution's loan accounting data.

TABLE 1

CRD Data Characteristics[1]

	COUNTS
Statements	2,062,806
Loan Accounting System Defaults	213,453
Statements with CCA EDF in June 2017	42,829
Defaults with Statements	62,206

TABLE 2

Distribution of Defaults by Type

	PERCENTAGE OF TOTAL DEFAULTS
90 Days Past Due (Non-Pass)	8%
Loss Provision	44%
Non-Accrual	25%
Charge-Off	13%
Loss	8%
Trouble Debt Restructuring	1%
Bankruptcy	0.2%
Unknown	1%

Definition of Default

We define "default" in accordance with our interpretation of the Basel II directive. Our methodology detects default and near-default events over time for all banks. Borrowers are flagged as defaulters if they are 90 days past due with a non-pass rating, are in non-accrual status, have an internal bank rating corresponding to the regulatory ratings "Doubtful" or "Loss," or have an obligation partially or entirely charged-off. We also flag "Substandard" ratings, but consider these indicative of near-defaults and exclude them from our definition of default.

After detecting all defaults, we aggregate the data into a single default event for each defaulted borrower. For date of default, we use the date of the borrower's earliest default event. For severity of default, we use the borrower's most severe default type. Table 2 shows the distribution of defaults in the CRD by default type.

Lending Performance Measures

Lending performance measures utilize loan accounting data provided by participating U.S. institutions. This data provides quarterly snapshots of loan level information, such as internal bank ratings, coupon rates, balances, and commitments for each institution's middle market commercial portfolio. We use this data to detect default events, to map internal bank ratings to a standard regulatory rating, and to track balance and commitment information over time. The CRD began collecting this data in 1999.

Private Firm Default Rates

We present the default rate in three forms. Figure 1 provides a rolling 12-month default rate for U.S. private firms by default type. As noted above, a borrower is considered to be in default if 90 days past due with a non-pass rating, in non-accrual status, rated Doubtful or Loss, or partially or entirely charged-off. This default rate does not include borrowers rated as Substandard. Figure Figure 3 presents the same information on a balance-weighted basis, with the default rate expressed as a percentage of the banks' outstanding balance amount, as of each quarter end date. Figure 2 includes borrowers rated as Substandard in its rolling 12-month default rate. While Figure 1 and Figure 3 represent actual default occurrences over time, Figure 2 illustrates how banks perceive potential, future default risk. We calculate the default rate using all loan accounting records, regardless of whether or not there is a corresponding financial statement.

---

[1] CRD Data characteristics exclude companies in industries such as Finance & Insurance, Public Administration, Management, and Education.

Charts also include a projection value. We include this value because a significant reporting lag exists between default occurrence and the time when the default information is actually received. For example, as of June 2017, we observe borrowers that are 90 days past due, but have a pass rating. A certain proportion of these borrowers will become non-pass rated in the future. In such cases, we record each default as occurring on the date the borrower first became 90 days past due. An analysis using eight years of data shows that, on any given quarter end date, banks report approximately 88% of defaults occurring one year prior, 87% of those occurring nine months prior, 63% of those occurring six months prior, and only 50% of those occurring three months prior. The projection provides an estimate of what the actual default rate likely will be, once we receive all of the default information.

As of June 2017, private firm default rates have declined steadily over the past six years. At 1.5%, the rolling 12-month default rate is down 73% from its September 2009 peak of 5.3% (Figure 1). The trend has been driven primarily by a decline in the charge-off rate, now at 0.4%, its lowest level in the last ten years. In addition, the proportion of borrowers in non-accrual status has decreased by 52% since September 2009. The percentage of borrowers rated "Substandard" has seen a steady increase since the fourth quarter of 2014 and remains slightly above pre-crisis levels, reflecting banks' cautious lending practices (Figure 2).

Figure 1 Rolling 12-Month Private Firm Default Rate by Default Type
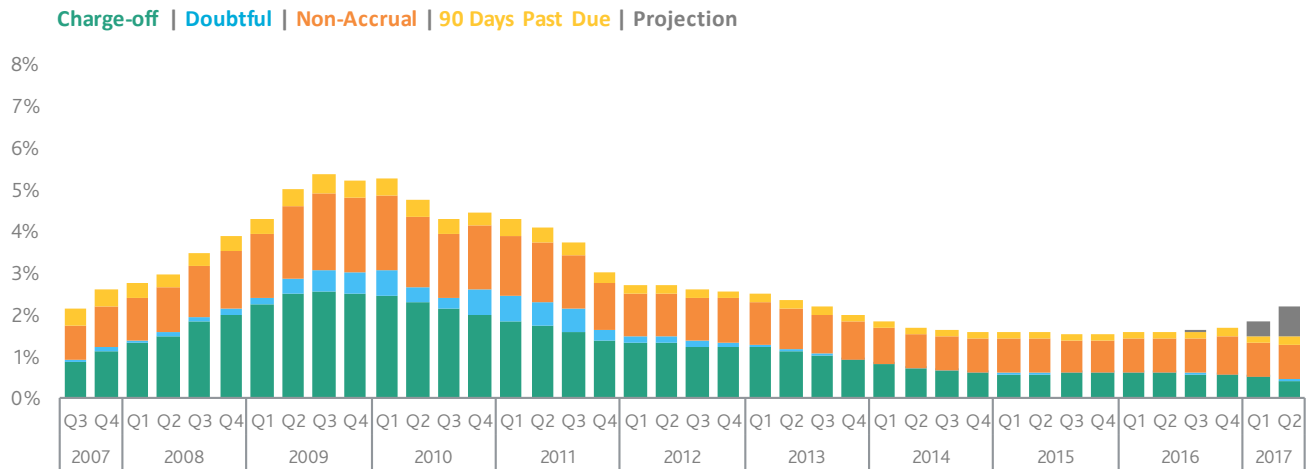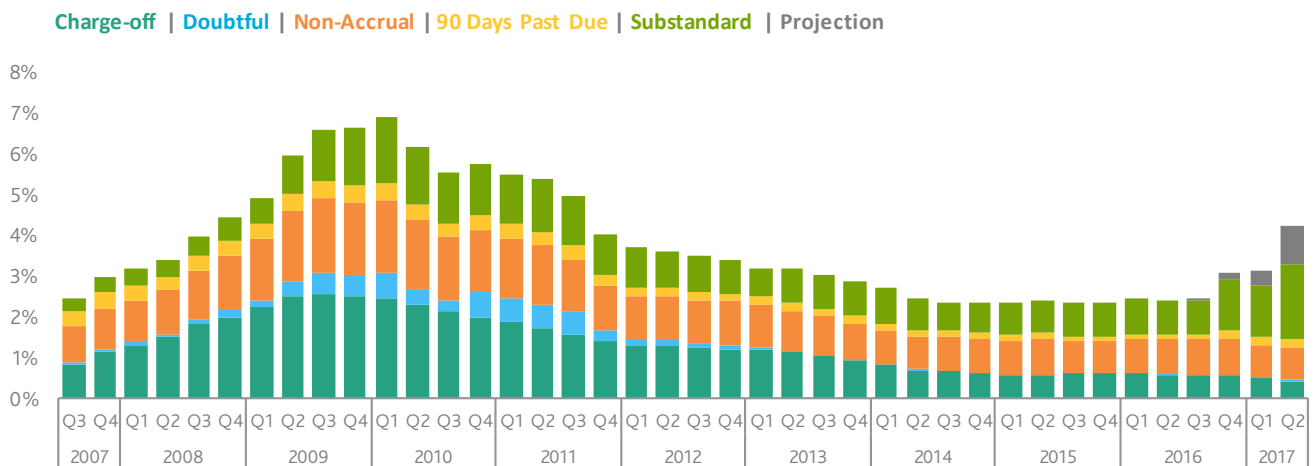

Figure 2 Rolling 12-Month Private Firm Default Rate by Default Type, Including Near-Defaults [2]

[2] We calculate the rolling 12-month default rate as the total number of defaulted and near-defaulted (i.e., Substandard) borrowers during the past four quarters, divided by the average number of borrowers across the same four quarters.

Figure 3 shows the 12-month rolling default rate, weighted by outstanding balance, for the entire CRD. Like its unweighted counterpart in Figure 1, a borrower is considered in default if they are 90 days past due with a non-pass rating, in non-accrual status, rated Doubtful or Loss, or partially or entirely charged-off. However, in contrast to Figure 2, this default rate does not include borrowers rated Substandard.

While all three above graphs show a similar trend, it is particularly interesting to note that in 2013 and 2014, the balance-weighted default rate (Figure 3) actually dipped below the equally-weighted rate (Figure 1). However, this trend reversed in 2015 when energy firms, which tend to be more capital-intensive than other industries, began defaulting at higher rates amid the oil price slump. In 2017, the balance-weighted default rate again fell below the equally-weighted rate.

Figure 3 Twelve-Month Rolling Overall Default Rate, Weighted by Outstanding Balance
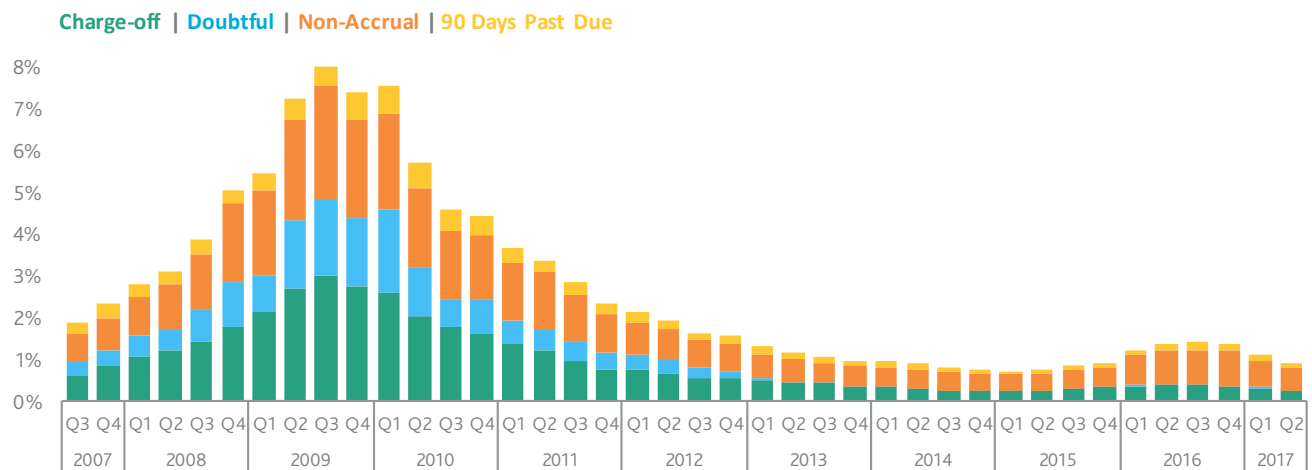
Adversely Rated Credits

This analysis examines the actual and perceived future risk of the portfolios contained in the Credit Research Database. Figure 4 shows the rates at which borrowers classified as Substandard migrated to more or less severe classifications during the past five years.

Figure 5 presents adversely rated credits as a percentage of all loan balances over time. Table 3 shows adversely rated credits as a percentage of total loan balances by year and industry. Figure 6 presents adversely rated credits as a percentage of loan balances, as of June 2017, by regulatory rating and industry. Because many banks cease tracking loan information once a loss occurs, loss percentages are most likely higher than presented.

The number of Substandard borrowers upgraded has been comparable or greater than that of those downgraded for the past five years (Figure 4). Additionally, the percentage of balances rated Substandard has come down from the 11% high mark posted in December 2009, now at 2% (Figure 5).

The percentage of balances adversely rated continues to decrease from the 26% high mark posted in June 2009, now at 8% (Figure 5). *Mining, Oil & Gas* bears the greatest percentage of adversely-rated balances as of June 2017 (Figure 6), though the sector has fallen from 62% to 45% during the past year, as the economy and oil prices recover from the 2014–2016 commodities sell-off (Table 3). *Agriculture & Hunting* and *Wholesale* continue to carry high percentages of adversely-rated balances (Figure 6), but *Construction* has seen a 2.6% improvement since December 2016 (Table 3). Adverse ratings are much less prevalent in *Finance & Insurance* and in sectors with significant government interest or oversight, such as *Public Administration* (Figure 6).

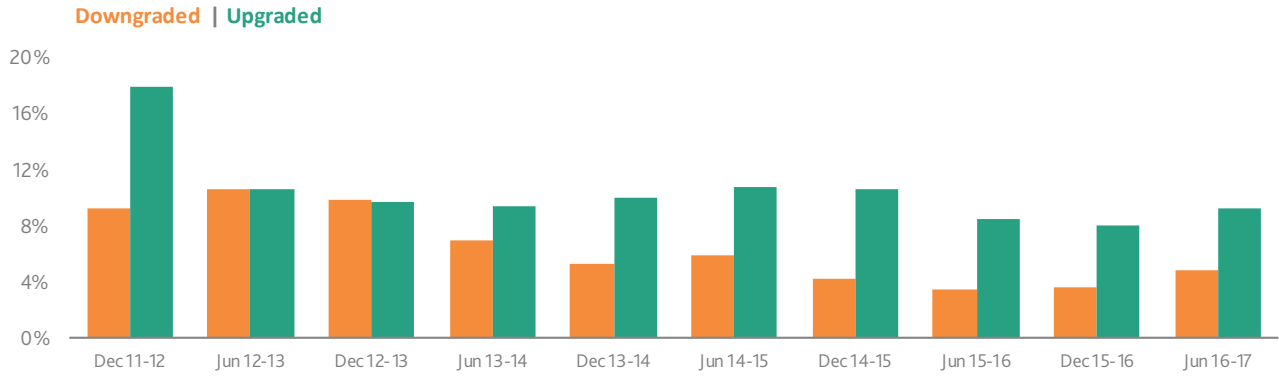Figure 4 Migration from Substandard to Other Classifications

Downgraded | Upgraded

Figure 5 Percentage of Balances with Adverse Bank-Assigned Regulatory Ratings, as of June 2017

Watch | OLEM | Substandard | Doubtful | Loss
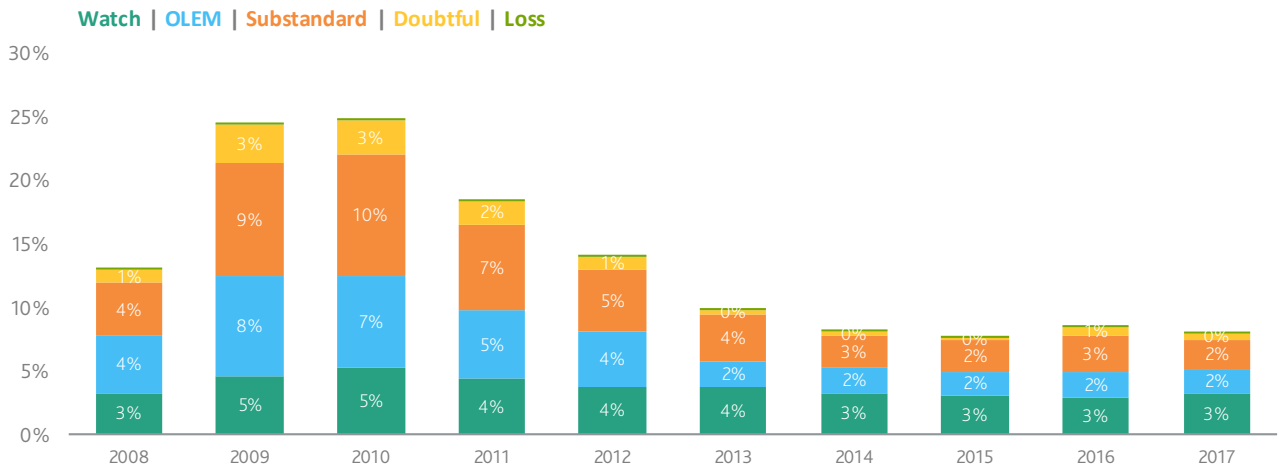
TABLE 3

Percentage of Balances with Adverse Bank-Assigned Regulatory Ratings, by Industry and Year

	2013	2014	2015	2016	2017
Admin & Waste Mgmt	12.0%	14.4%	12.1%	11.1%	12.2%
Agriculture & Hunting	19.4%	16.0%	10.9%	14.9%	18.9%
Arts & Entertainment	10.5%	8.0%	7.3%	5.9%	5.8%
Construction	27.4%	19.6%	15.1%	14.8%	12.2%
Education	6.9%	6.3%	7.5%	6.4%	6.7%
Finance & Insurance	4.3%	3.4%	3.2%	3.6%	2.9%
Health Care	7.3%	7.9%	6.5%	8.4%	8.2%
Hospitality	10.7%	8.2%	7.1%	6.0%	7.3%
Information & Culture	7.6%	6.0%	4.5%	5.7%	7.1%
Management	13.2%	10.1%	7.2%	9.6%	6.9%
Manufacturing	11.5%	10.7%	9.2%	10.4%	11.2%
Mining, Oil & Gas	7.8%	8.5%	27.6%	62.0%	44.7%
Other Svcs	12.6%	10.7%	10.0%	8.9%	8.5%
Prof & Tech Svcs	9.8%	10.9%	10.4%	9.0%	9.6%
Public Admin	2.4%	2.0%	2.1%	1.4%	1.1%
Real Estate & Leasing	12.4%	7.6%	5.2%	4.1%	3.9%
Retail	11.4%	9.2%	7.7%	7.2%	7.7%
Transportation	9.5%	7.1%	8.6%	10.0%	10.4%
Unknown	25.3%	17.6%	16.7%	11.8%	15.8%
Utilities	5.3%	3.8%	4.3%	4.6%	4.6%
Wholesale	11.1%	11.3%	11.5%	12.9%	13.0%

Figure 6 Percentage of Balances with Adverse Bank-Assigned Regulatory Ratings in Current Period, by Industry
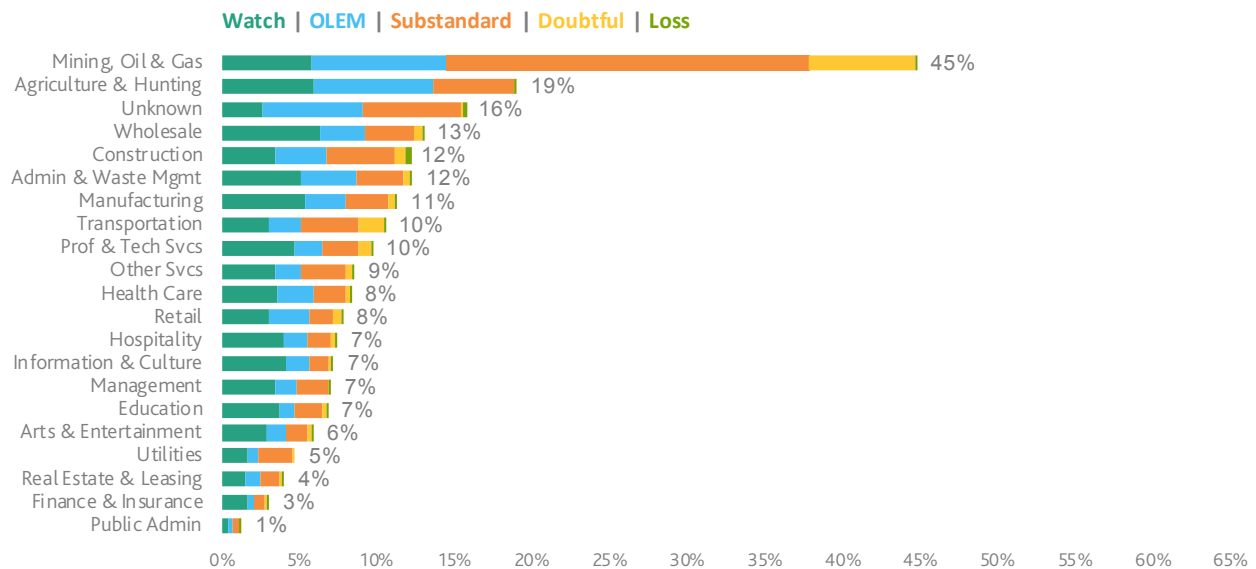
Internal Risk Rating Migration Summary

The rate at which banks change internal risk ratings reveals how they interpret changes in the credit risk of their portfolios. Figure 7 shows the migration of internal risk ratings assigned to borrowers by institutions annually since 2008. A borrower is considered "Upgraded" when an institution changes its risk rating to one that is less severe; a borrower is considered "Downgraded" when the rating increases in severity.

In 2017, banks downgraded 17% of borrowers, compared to 15% a year ago.

Figure 7 Yearly Migration Summary of Bank-Assigned Risk Ratings
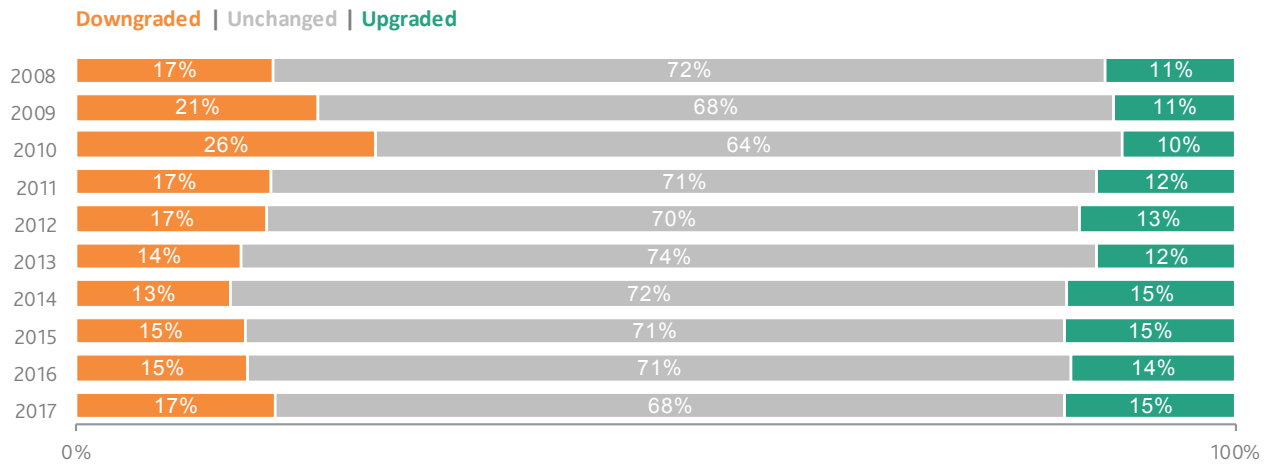
Coupon Rates

Figure 8 presents the average coupon rate by bank-assigned regulatory rating over time. The figure also shows the primary credit discount rate offered by the Federal Reserve. Interest rates for non-pass borrowers in the middle market have seen a slow and steady increase since the first quarter of 2015. The interest rate spread between the two peaked at 1.55% in December 2016, and it has decreased to 1.43% as of June 2017.

Figure 8 Mean Coupon Rates by Regulatory Rating Over Time
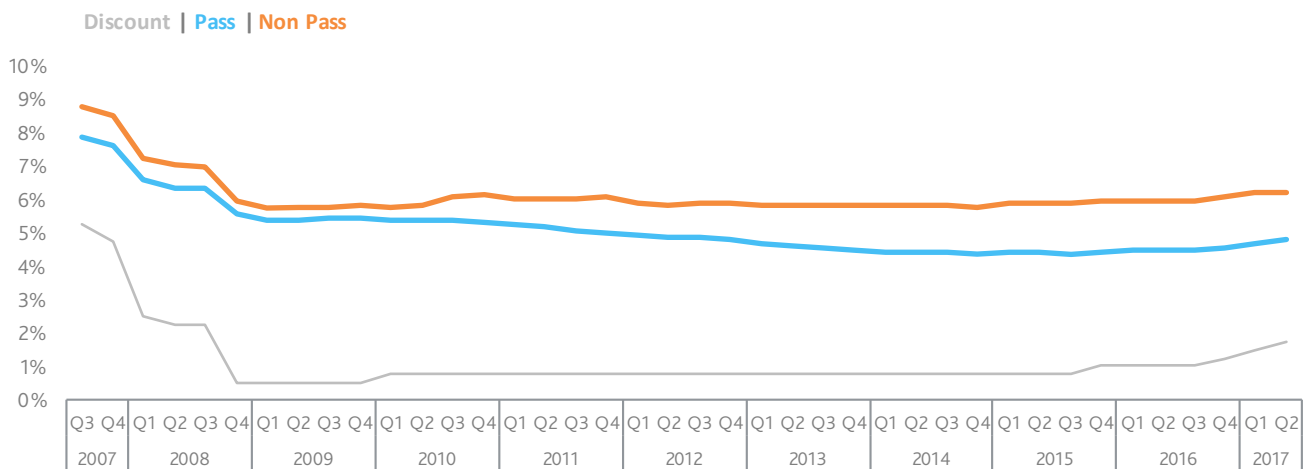
New Originations

The following section examines the new origination of commercial and industrial (C&I) loans to middle-market borrowers, using loan accounting data from the CRD. We translate growth rates to level indices that represent the dynamics of new origination for the aggregate set of banks. In order to measure the organic growth rates in loan originations over time, we smooth the underlying data by computing four-quarter moving averages across each data point and adjust by excluding the effects of mergers & acquisitions, banks opting out of CRD participation, and other factors.[3]

Figure 9 shows the rate of new originations for all loans, with the level at Q1 2007 indexed to 100. This graph will be updated using 2017 data in the May 2018 Middle Market Risk Report.

Figure 9 New Originations for All Loans by Quarter, Indexed to Q1 2007 = 100
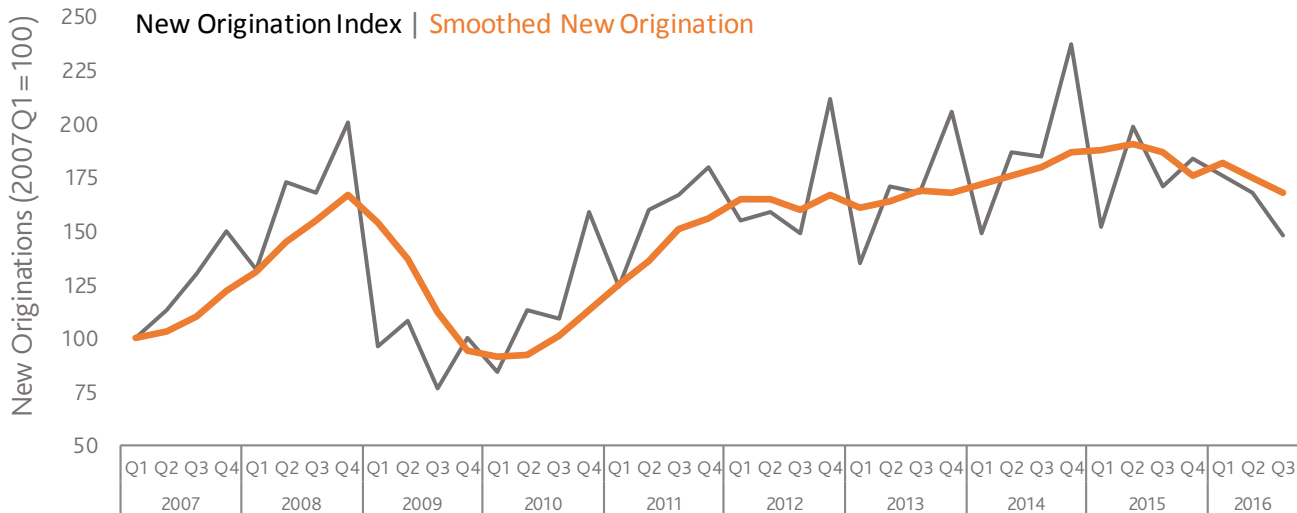
Figure 10 presents the loan origination activity for the *Mining, Oil & Gas* industry relative to the WTI crude oil price. In the graph, we can see that they are highly correlated. Due to the impact of commodity prices on corporate earnings, the *Mining, Oil & Gas* industry tends to be much more volatile than others.' This graph will be updated using 2017 data in the May 2018 report.

Figure 10 WTI Crude Oil Price (USD/barrel) vs. Origination Activity Indexed to Q1 2007 = 100

---
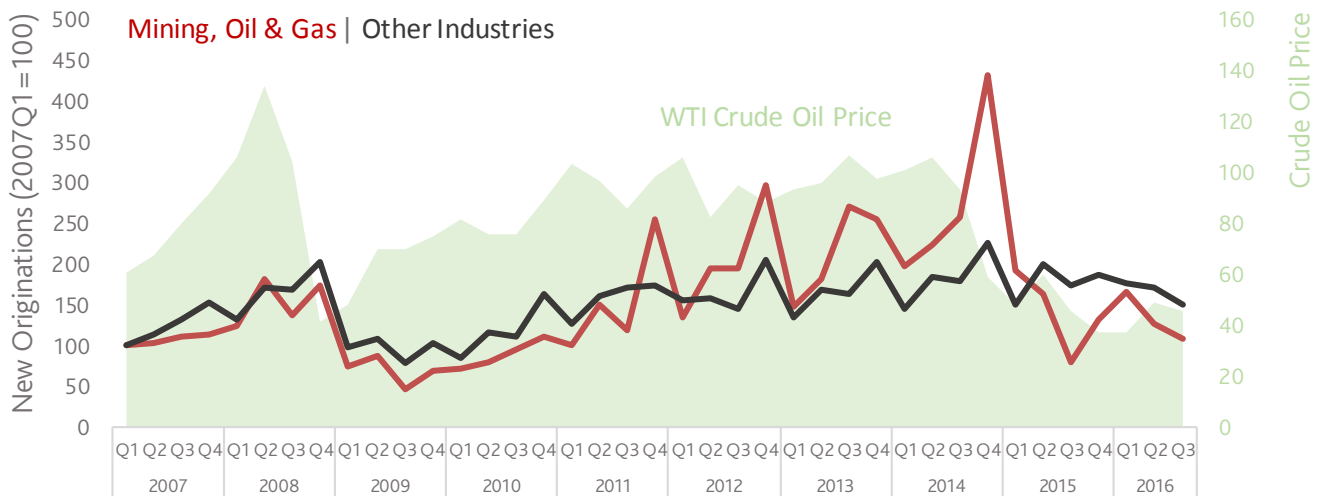
[3] For more details regarding methodology, please see Jeng, Xu & Yahalom. (October 2016). *What Do 20 Million C&I Loan Observations Say about New Origination Dynamics? – Insights from Moody's Analytics CRD Data.*

EDF Credit Measures

We generate the EDF credit measures presented throughout this report using RiskCalc 4.0 U.S. Corporate Financial Statement Only (FSO) mode and Credit Cycle Adjusted (CCA) mode. Unlike the Financial Statement Only (FSO) mode, which delivers EDF credit measures based primarily on financial and industry information, the CCA mode adjusts for the market's current credit cycle assessment. We measure this factor using the distance-to-default estimate from Moody's Analytics Public Firm Model. The CCA EDF credit measure is a forward-looking indicator of probability of default.

RiskCalc 4.0 CCA EDF Credit Measure Trends

Figure 11 and Figure 12 present Credit Cycle Adjusted (CCA) One-Year EDF credit measures over time. Figure 12 segments by regulatory rating.

The median RiskCalc 4.0 CCA EDF value for the U.S. bottomed at 0.5% in August 2014, increased to 0.8% in December 2016, and it has fallen back to 0.6% as of June 2017 (Figure 11). The median CCA EDF value for Non-Pass borrowers decreased from 2.6% in December 2016 to 2.4% in June 2017 (Figure 12).

Figure 11 CCA EDF Credit Measures Trends [4]
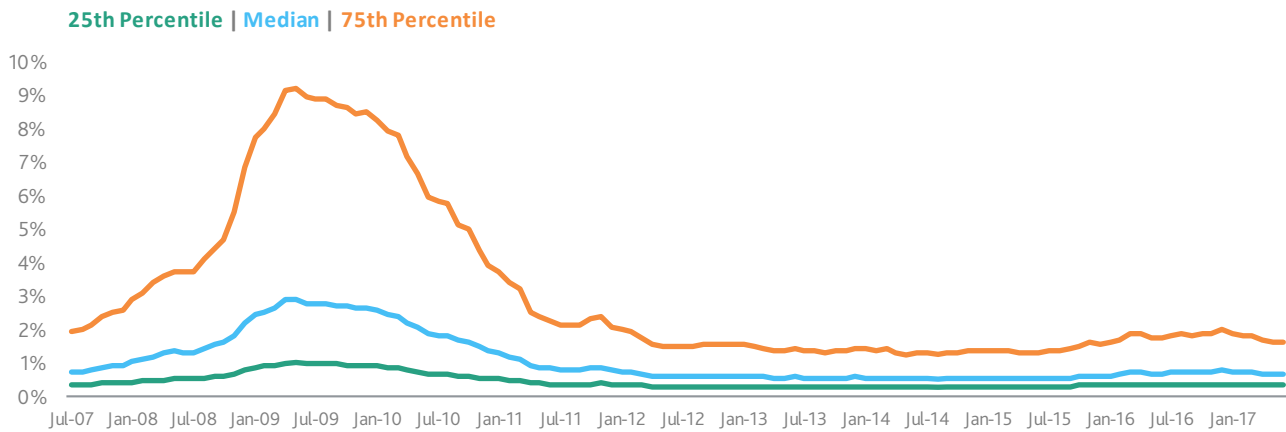
Figure 12 Median CCA EDF Credit Measures by Regulatory Rating [5]

---
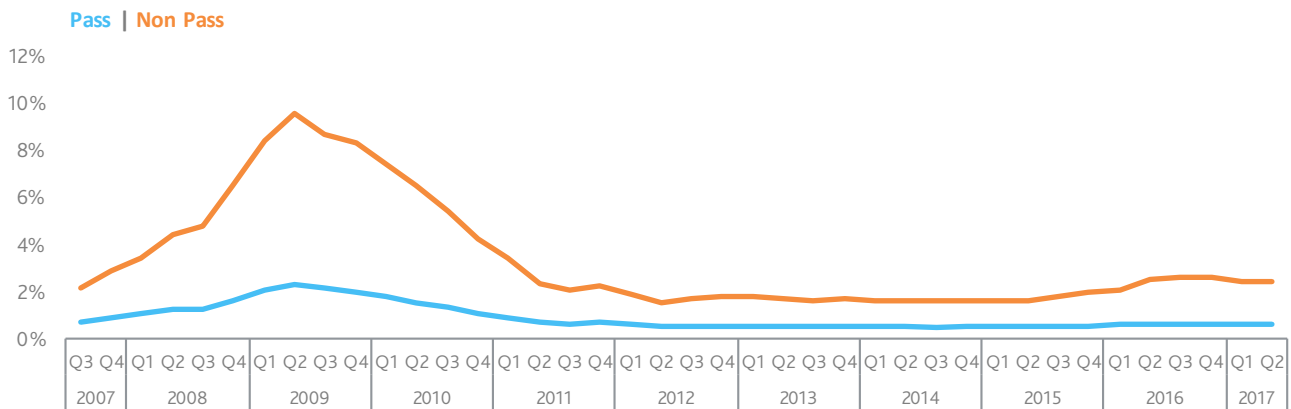
[4] This chart displays monthly CCA EDF value observations. It does not include borrowers from industries for which RiskCalc is not designed, such as Vehicle Dealers, Financials, Insurance, Government Services, and Real Estate.

[5] This chart displays quarterly CCA EDF value observations due to the reporting frequency of bank loan accounting data.

RiskCalc 4.0 Exposure-Weighted Average CCA EDF Credit Measure

Figure 13 depicts the exposure-weighted average EDF credit measure compared against the mean EDF credit measure for borrowers with both an EDF credit measure and an outstanding exposure, as of the quarter-end for the past ten years.

Figure 13 Exposure-Weighted Average vs. Mean CCA EDF Credit Measure
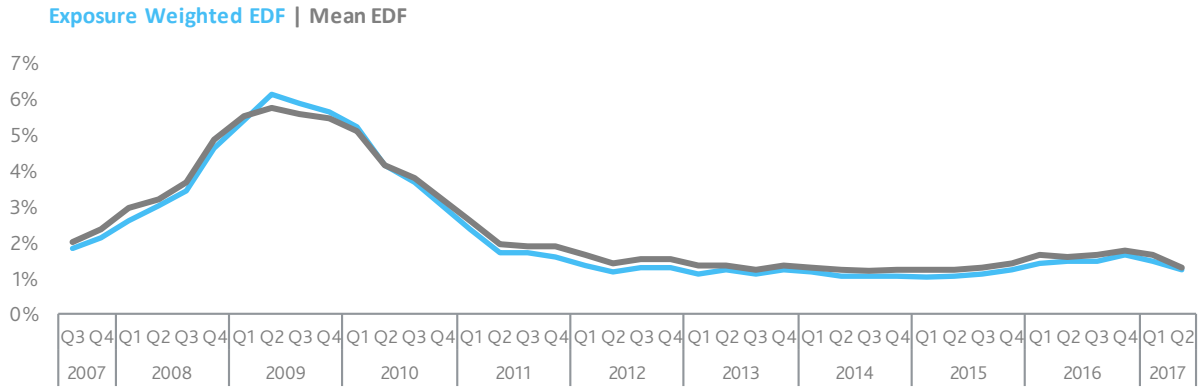
RiskCalc 4.0 FSO EDF Credit Measure Loan Vintage Analysis

Figure 14 presents risk level as measured by credit loans' median FSO EDF value by year of origination.

Similar to the trends following previous economic downturns, loans originated 2009–2011 showed a decreasing level of risk. The median FSO EDF value for different types of vintage loans has declined in each of the last five years. The convergence indicates the improving credit risk profile of middle market portfolios and tighter lending standards.

Figure 14 Median Financial Statements Only (FSO) One-Year EDF Value by Origination Year
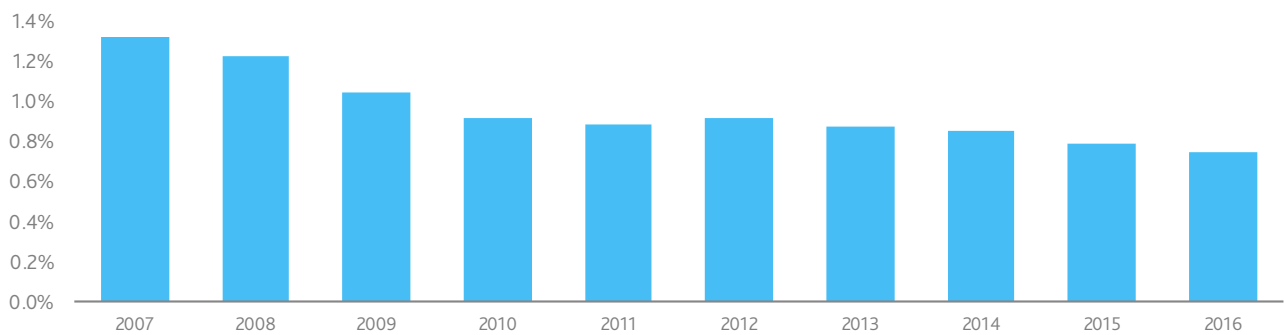
RiskCalc 4.0 Ratio Trends

Figure 15 presents RiskCalc ratio percentiles over time and does not incorporate any credit cycle adjustment. The median of borrowers' financial ratios generally improved in 2016. *Debt Coverage* is at its highest level in more than ten years. *Leverage*, as measured by retained earnings over current liabilities, has continued to improve during the past decade. *Sales Growth* and *Change in ROA*, despite slowing in 2016, have both remained positive after the financial crisis, indicating steady growth for borrowers. Median borrower *size* has risen each year since 2012, indicating banks' preferences in lending to larger borrowers, though the high value in 2016 is due to the timing of financial statements filing and will likely revert to trend once banks collect smaller borrowers' financial statements. We also observe rising *Inventory to Sales* and *Current Liabilities to Sales* ratios, while *Liquidity* and *ROA* ratios have remained steady.

Figure 15 Financial Statement Ratios Used in RiskCalc 4.0 (25th, 50th, and 75th Percentiles)

Activity
(Δ in Working Capital/ Sales)

Activity
(Inventory / Sales)

Growth
(Sales Growth)

Liquidity
(Cash / Assets)

Size
(CPI Adjusted Assets)
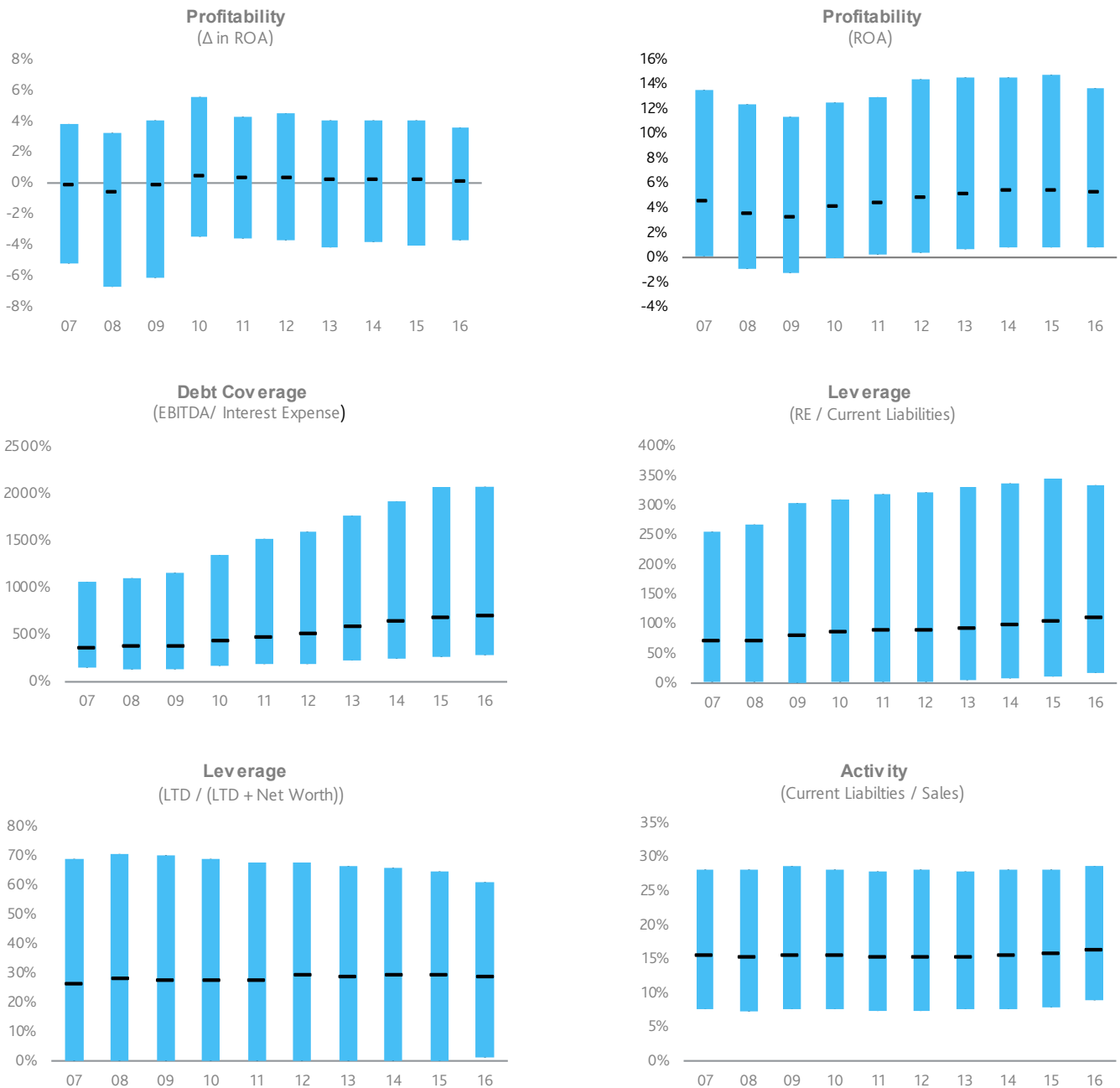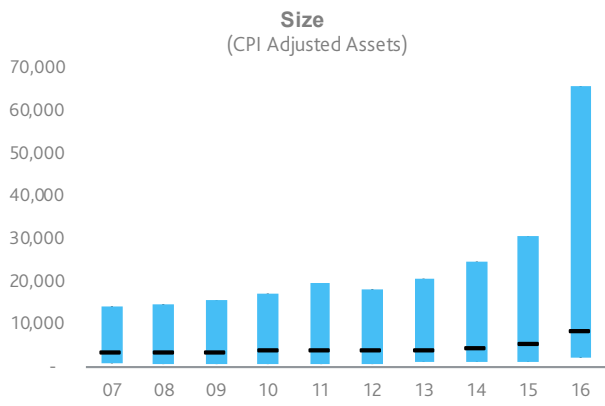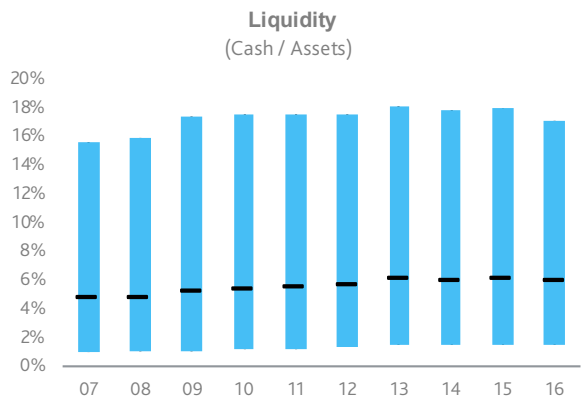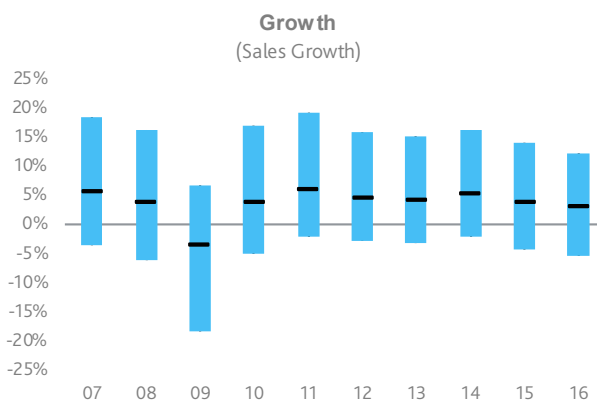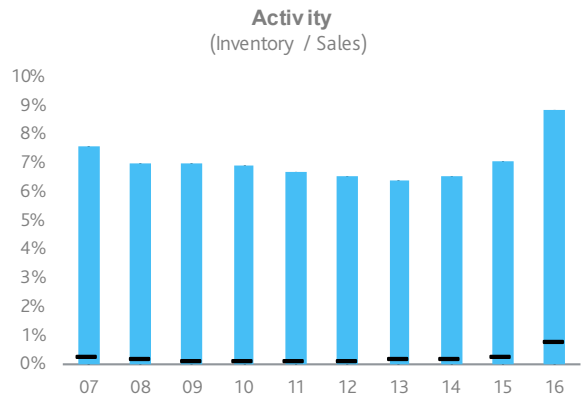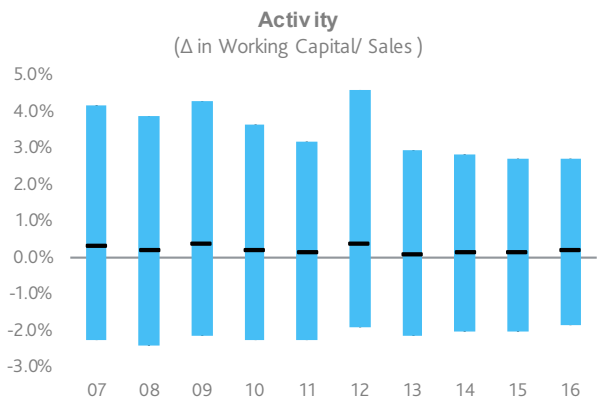
Industry Analysis

Table 4 presents median CCA EDF credit measures by NAICS industry, as of June, for each of the past ten years. Figure 16 through Figure 18 show CCA EDF credit measures by sector as of June 2017: Figure 16 presents median EDF values, Figure 17 shows percentage changes in median EDF over the past year, and Figure 18 presents the percentage of borrowers in each industry with an EDF value above the 90th percentile for the entire population.

The industries with the greatest risk in June 2017, as measured by RiskCalc CCA EDF credit measures, were *Mining, Oil & Gas*, *Information & Culture*, and *Real Estate & Leasing*. (Figure 16). However, the average EDF value for *Mining, Oil & Gas* has decreased by 16% over the past year as oil prices stabilized. Transportation showed the largest EDF value increase, climbing 20% year over year (Figure 17).

Mining, Oil & Gas also showed the largest concentration of highly risky borrowers: 26% of firms in this sector had CCA EDF values higher than 90% of the overall population (Figure 18). *Information & Culture* and *Agriculture & Hunting* were the second and third riskiest sectors using this measure, both around 16%. *Utilities*, at 3%, had the lowest proportion of highly risky borrowers.

TABLE 4

Median CCA EDF Measures by NAICS Sector [6]

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Admin & Waste Mgmt	1.17%	2.38%	1.66%	0.80%	0.59%	0.65%	0.59%	0.61%	0.68%	0.59%
Agriculture & Hunting	0.85%	2.56%	2.67%	1.12%	0.55%	0.62%	0.61%	0.57%	0.83%	0.81%
Arts & Entertainment	1.56%	3.34%	2.19%	1.00%	0.59%	0.60%	0.55%	0.54%	0.66%	0.66%
Construction	2.22%	3.83%	2.97%	1.46%	1.01%	0.84%	0.81%	0.76%	0.82%	0.65%
Health Care	0.66%	1.47%	0.99%	0.50%	0.42%	0.39%	0.36%	0.36%	0.45%	0.42%
Hospitality	1.54%	3.33%	1.94%	0.87%	0.51%	0.47%	0.48%	0.48%	0.55%	0.54%
Information & Culture	1.68%	3.91%	2.77%	1.00%	0.86%	0.87%	0.72%	0.81%	1.17%	1.13%
Manufacturing	1.48%	3.44%	2.41%	0.92%	0.64%	0.61%	0.53%	0.58%	0.74%	0.70%
Mining, Oil & Gas	0.63%	1.35%	1.41%	0.59%	0.42%	0.57%	0.48%	0.62%	1.83%	1.53%
Other Svcs	0.84%	2.09%	1.37%	0.60%	0.43%	0.42%	0.40%	0.40%	0.50%	0.47%
Prof & Tech Svcs	1.09%	2.17%	1.57%	0.75%	0.58%	0.57%	0.56%	0.58%	0.62%	0.55%
Public Admin	0.53%	1.25%	1.06%	0.49%	0.37%	0.36%	0.32%	0.34%	0.38%	0.39%
Real Estate & Leasing	2.07%	4.79%	3.11%	1.38%	0.94%	0.90%	0.78%	0.83%	1.07%	0.94%
Retail	1.95%	3.73%	2.24%	0.97%	0.63%	0.64%	0.58%	0.60%	0.76%	0.79%
Transportation	1.36%	2.50%	2.17%	0.90%	0.57%	0.55%	0.51%	0.54%	0.74%	0.89%
Utilities	0.37%	0.81%	0.61%	0.33%	0.23%	0.25%	0.27%	0.31%	0.37%	0.39%
Wholesale	1.41%	2.49%	1.67%	0.74%	0.55%	0.57%	0.51%	0.56%	0.72%	0.71%

---

[6] This chart presents median EDF credit measures as of December of each year.

Figure 16 One-Year CCA EDF Measures by NAICS Sector

Sector	Value
Mining, Oil & Gas	1.5%
Information & Culture	1.1%
Real Estate & Leasing	0.9%
Transportation	0.9%
Agriculture & Hunting	0.8%
Retail	0.8%
Wholesale	0.7%
Manufacturing	0.7%
Arts & Entertainment	0.7%
Construction	0.7%
Admin & Waste Mgmt	0.6%
Prof & Tech Svcs	0.5%
Hospitality	0.5%
Other Svcs	0.5%
Health Care	0.4%
Public Admin	0.4%
Utilities	0.4%
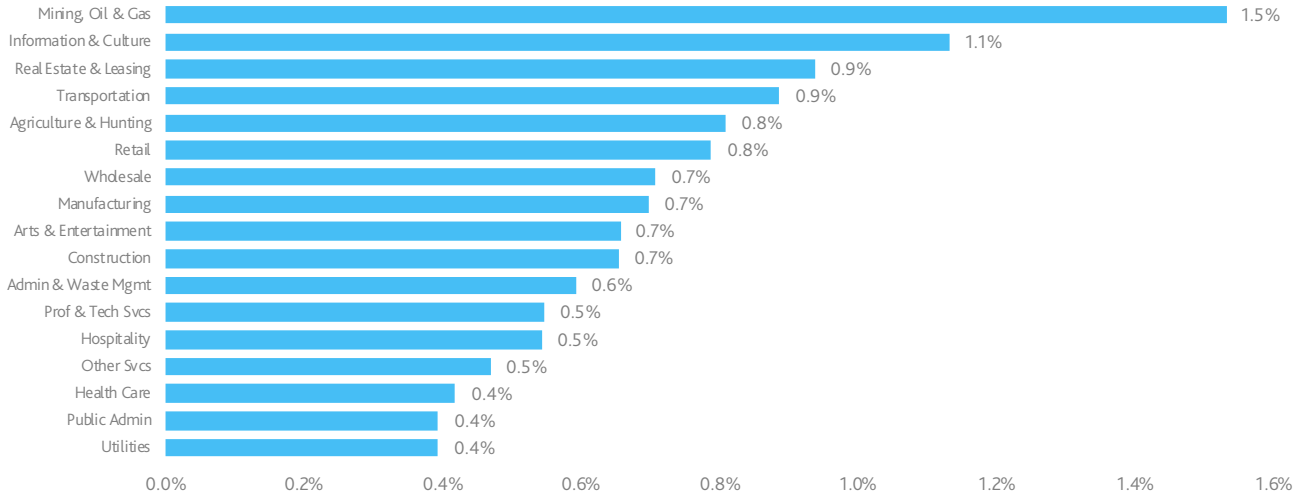
Figure 17 Percentage Change in CCA EDF Measures During Past Year

Sector	Change
Transportation	20%
Utilities	6%
Retail	3%
Public Admin	2%
Arts & Entertainment	-1%
Wholesale	-1%
Hospitality	-2%
Agriculture & Hunting	-3%
Information & Culture	-3%
Manufacturing	-6%
Other Svcs	-6%
Health Care	-8%
Prof & Tech Svcs	-12%
Real Estate & Leasing	-12%
Admin & Waste Mgmt	-13%
Mining, Oil & Gas	-16%
Construction	-20%
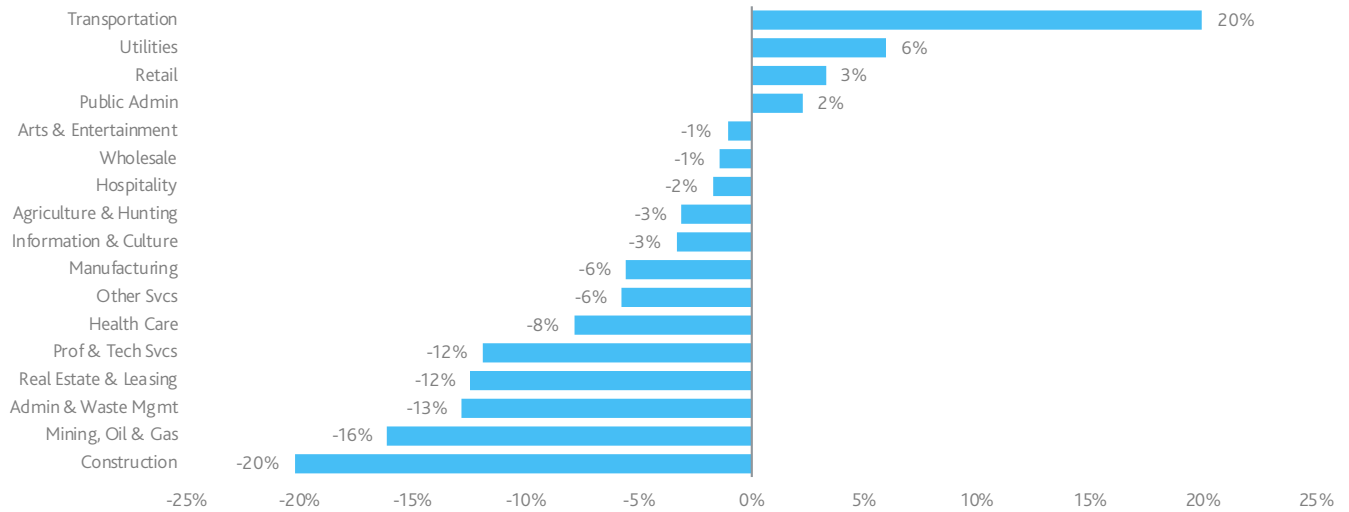
Figure 18 Percentage of Firms with CCA EDF Measures Greater than 90th Percentile
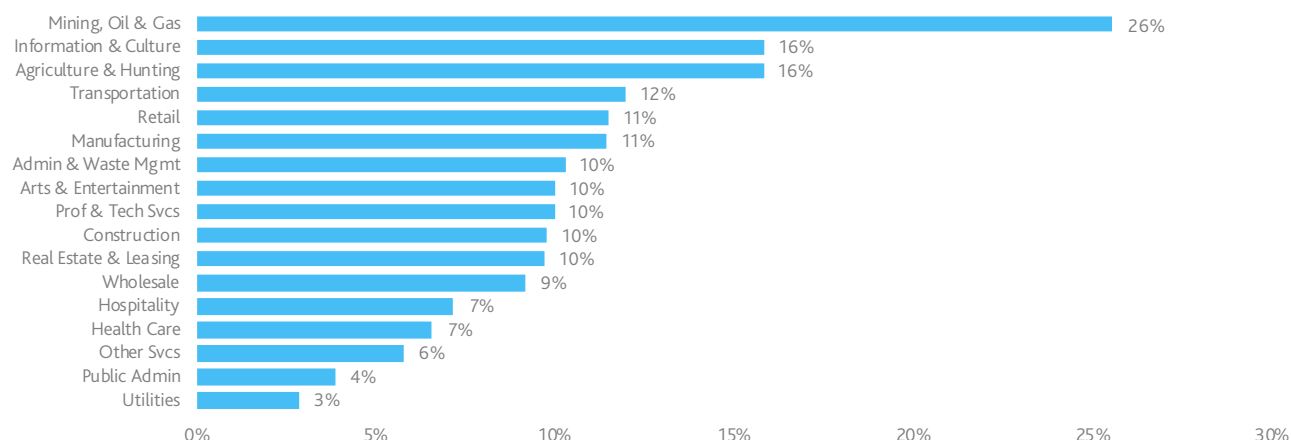
Credit Migration

This section reports CCA EDF credit measure migrations during three different periods. To construct each migration matrix, we group firms into rating categories using their CCA EDF credit measures. Tables 5, 6, and 7 show annual transition rates averaged during the periods since June 2007 (ten years ago), June 2012 (five years ago), and June 2016 (one year ago), respectively.

TABLE 5

CCA EDF-Implied Rating Migration: Average One-Year Rating Migration Rates (%), Over Ten-Year Period

| (2007-2017) TO | | | | | | | | | | | | | MIGRATION SUMMARY | |
FROM	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa-C	%UP	%DOWN
A1	39.2	31.1	10.5	5.4	5.8	3.1	1.6	1.0	1.8	0.2	0.1	0.0	0.2		60.8
A2	13.5	33.3	20.2	10.8	10.7	4.9	2.9	1.3	0.9	0.6	0.4	0.2	0.3	13.5	53.2
A3	3.4	20.9	23.2	16.4	18.1	7.9	4.1	2.1	1.4	1.1	0.5	0.4	0.5	24.2	52.5
Baa1	1.0	10.8	18.4	18.5	25.8	11.3	5.7	3.1	2.0	1.4	0.7	0.5	0.8	30.2	51.3
Baa2	0.3	3.8	9.6	13.9	31.4	19.3	9.4	4.5	2.8	2.1	1.1	0.8	1.1	27.6	41.0
Baa3	0.1	1.0	3.2	6.6	24.2	27.4	16.9	8.0	4.5	3.1	1.8	1.3	2.0	35.0	37.6
Ba1	0.0	0.3	1.2	2.6	13.1	23.3	24.3	14.1	8.0	5.1	2.7	2.0	3.2	40.6	35.1
Ba2	0.0	0.1	0.5	1.3	6.6	15.2	23.2	20.0	13.0	8.4	4.1	2.8	4.8	46.9	33.1
Ba3	0.0	0.1	0.3	0.7	3.8	9.3	17.1	19.8	18.0	13.4	6.5	4.3	6.9	51.0	31.0
B1	0.0	0.0	0.1	0.4	2.2	5.7	11.7	15.9	18.4	17.9	10.2	7.3	10.3	54.5	27.7
B2	0.0	0.0	0.1	0.3	1.6	3.8	7.7	11.5	15.4	18.9	13.6	10.7	16.2	59.5	26.9
B3	0.0	0.0	0.1	0.2	1.0	2.8	5.7	8.7	12.3	16.7	14.4	13.9	24.2	61.9	24.2
Caa-C	0.0	0.0	0.0	0.1	0.6	1.5	3.0	4.8	7.2	11.2	11.4	13.8	46.2	53.8	

TABLE 6

CCA EDF-Implied Rating Migration: Average One-Year Rating Migration Rates (%), Over Five-Year Period

(2012-2017) TO														MIGRATION	SUMMARY
FROM	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa-C	%UP	%DOWN
A1	42.6	33.4	10.3	4.4	4.5	2.1	1.6	0.5	0.4	0.2	0.1	0.0	0.0		57.4
A2	10.1	39.4	22.0	10.3	9.1	3.9	2.3	1.1	0.7	0.4	0.3	0.2	0.2	10.1	50.5
A3	2.0	19.9	28.4	18.5	16.9	6.6	3.3	1.8	1.1	0.7	0.3	0.3	0.3	21.8	49.8
Baa1	0.6	7.9	19.5	23.0	27.8	10.1	4.7	2.5	1.5	1.1	0.6	0.3	0.4	28.0	49.0
Baa2	0.2	2.7	8.0	14.4	38.0	19.8	7.7	3.5	2.1	1.6	0.8	0.5	0.6	25.3	36.6
Baa3	0.0	0.8	2.4	5.3	24.7	33.8	17.3	6.7	3.6	2.3	1.3	0.9	1.0	33.2	33.1
Ba1	0.0	0.3	1.0	2.1	10.8	25.0	30.0	14.6	6.8	4.0	2.0	1.5	1.9	39.2	30.8
Ba2	0.0	0.1	0.4	1.1	5.6	13.1	26.2	25.2	13.4	6.9	3.1	2.0	2.8	46.6	28.2
Ba3	0.0	0.1	0.3	0.7	3.3	7.8	16.2	23.3	22.6	13.3	5.2	3.1	4.2	51.6	25.8
B1	0.0	0.1	0.2	0.4	2.1	5.1	10.6	15.8	21.7	21.8	10.0	5.9	6.4	55.9	22.3
B2	0.0	0.1	0.1	0.3	1.8	3.8	7.4	10.8	15.5	22.1	16.6	10.6	10.7	62.1	21.4
B3	0.0	0.0	0.1	0.2	1.0	2.9	5.9	8.5	12.0	17.2	16.9	16.6	18.6	64.8	18.6
Caa-C	0.0	0.0	0.1	0.2	0.8	1.7	3.4	5.6	8.0	11.9	12.2	15.3	40.8	59.2	

TABLE 7

CCA EDF-Implied Rating Migration: Average One-Year Rating Migration Rates (%), Over One-Year Period

(2016-2017) TO														MIGRATION	SUMMARY
FROM	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa-C	%UP	%DOWN
A1	44.8	33.9	9.9	2.8	4.8	1.0	2.3	0.0	0.5	0.0	0.0	0.0	0.0		55.2
A2	8.7	42.8	22.5	10.1	7.9	3.5	2.3	0.8	0.7	0.3	0.4	0.1	0.1	8.7	48.5
A3	1.3	20.0	31.4	18.6	16.0	6.0	2.7	1.7	1.0	0.5	0.2	0.3	0.1	21.3	47.2
Baa1	0.3	7.4	22.2	24.6	26.8	8.7	4.5	2.5	1.2	1.2	0.4	0.1	0.4	29.8	45.6
Baa2	0.2	2.0	7.8	14.8	41.4	18.7	6.9	3.3	1.7	1.5	0.8	0.5	0.4	24.8	33.8
Baa3	0.0	0.6	2.5	5.5	25.7	35.4	15.7	6.2	3.3	2.1	1.0	1.0	1.0	34.2	30.3
Ba1	0.0	0.2	0.8	1.6	10.9	26.0	31.6	14.1	6.3	3.7	1.7	1.3	1.7	39.5	28.9
Ba2	0.0	0.0	0.3	1.1	5.2	12.9	28.0	25.8	12.8	6.1	3.0	1.7	3.0	47.6	26.6
Ba3	0.0	0.0	0.3	0.5	2.8	7.3	17.1	25.1	23.1	12.4	4.8	2.7	4.0	53.0	23.9
B1	0.0	0.0	0.1	0.5	1.9	4.3	9.4	16.9	22.7	22.8	9.5	5.5	6.3	55.9	21.3
B2	0.0	0.1	0.1	0.2	1.4	4.1	7.5	10.0	16.1	24.0	17.0	9.5	10.0	63.5	19.5
B3	0.0	0.0	0.1	0.0	0.7	2.8	6.0	8.0	13.1	17.7	17.7	17.5	16.3	66.1	16.3
Caa-C	0.0	0.0	0.1	0.2	0.9	1.7	3.2	5.3	7.7	12.3	12.7	15.3	40.7	59.3	

Regional Analysis[7]

The map below (Figure 19) reports EDF credit measures by state. To estimate each state's median credit risk score, we use the median one-year CCA EDF score assigned by the RiskCalc U.S. 4.0 Model as of June 2017. The spectrum legend below the U.S. heat map contains the range of observed median EDF values in June 2017. Rhode Island has the lowest median EDF, 0.4%, while Oklahoma has the highest median EDF, 1.3%.

Figure 20 through Figure 22 present the ten largest changes in median EDF credit measures by state since June 2007, June 2009 (the end of the most recent recession), and June 2016, respectively. Oklahoma, Texas, and New Mexico saw the largest hikes in median CCA EDF values compared to ten years ago. Both state economies took a hit from the 2014–2016 oil price drop. North Carolina and Michigan showed the largest improvements, with 49% and 45% declines, respectively (Figure 20). All 50 states' median CCA EDF measures have fallen since June 2009. North Carolina led all states during this period with an improvement of 86% (Figure 21). EDF measures have declined in most states over the past year, although Montana and Texas saw EDF measure increases of 25% and 20%, respectively. (Figure 22).

Figure 19 One-Year CCA Median EDF Values by State as of June 2017

---
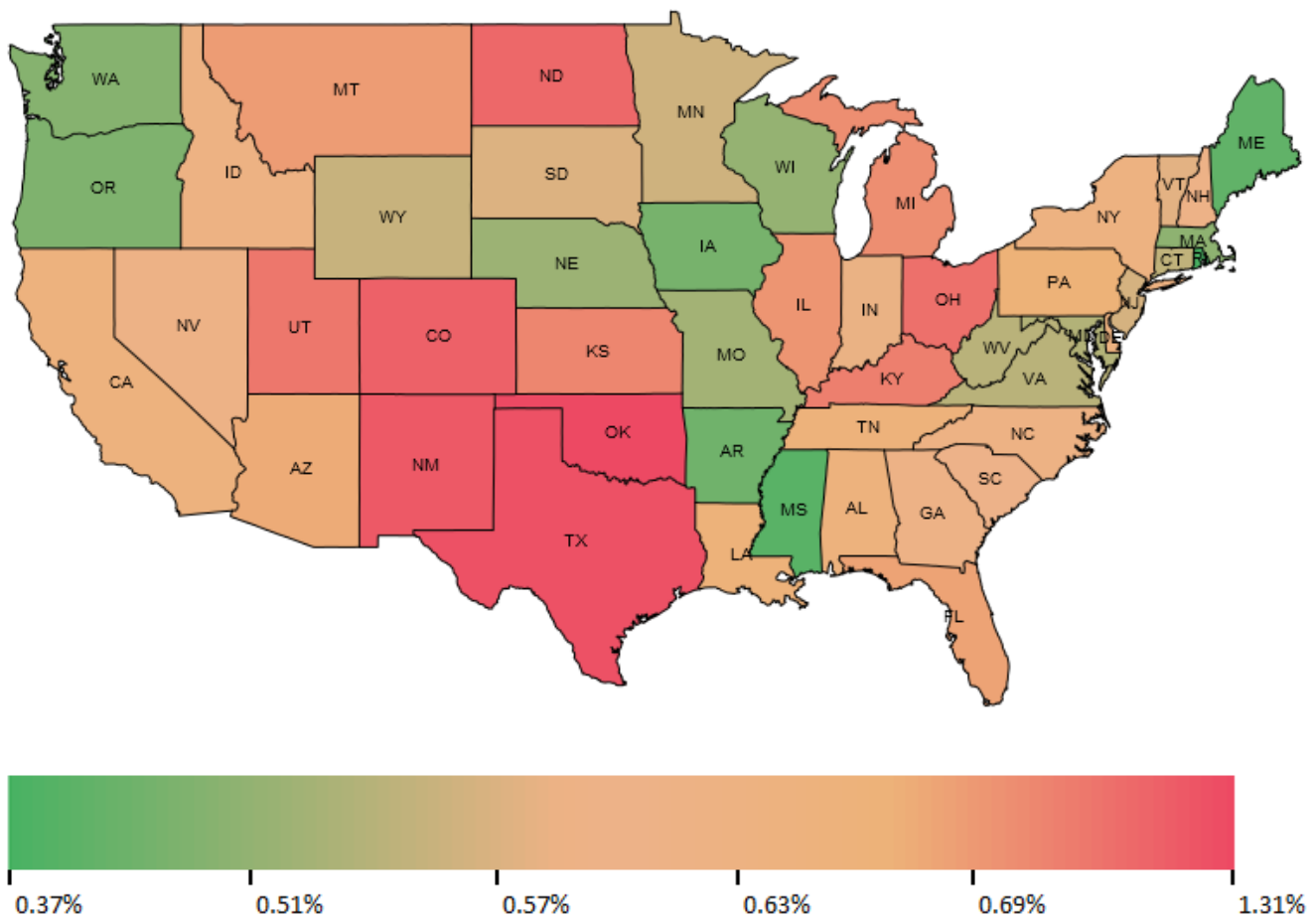
[7] The data used in constructing this map contains a relatively small number of observations from Hawaii and Alaska. For each state, median EDF values may reflect different data population characteristics including lenders (CRD Participants) and distributions of borrowers across industries, asset sizes, and other characteristics that may materially impact EDF values for that state. EDF calculations using RiskCalc 4.0 do incorporate some state-level macroeconomic factors, such as unemployment.

Figure 20 Top-Ten Largest Changes in One-Year CCA Median EDF Value Since June 2007
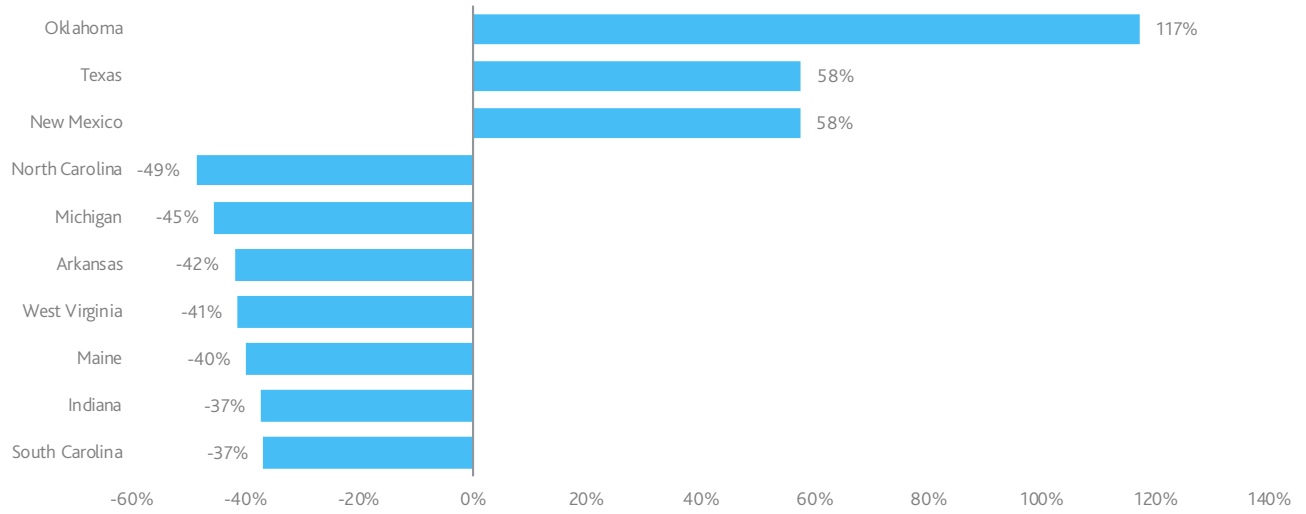
Figure 21 Top-Ten Largest Changes in One-Year CCA Median EDF Value Since June 2009
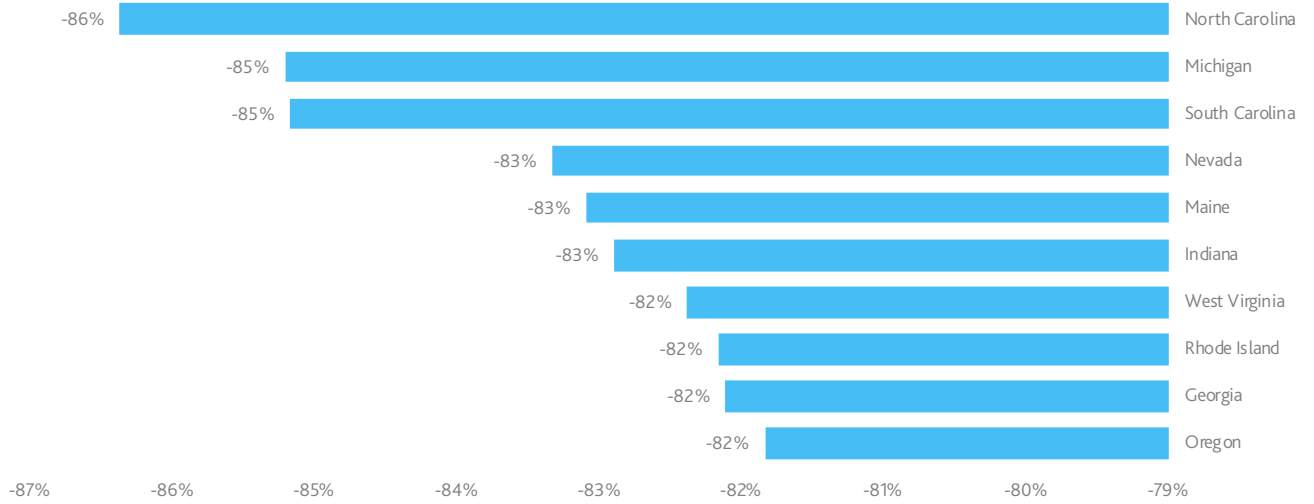
Figure 22 Top-Ten Largest Changes in One-Year CCA Median EDF Value Since June 2016
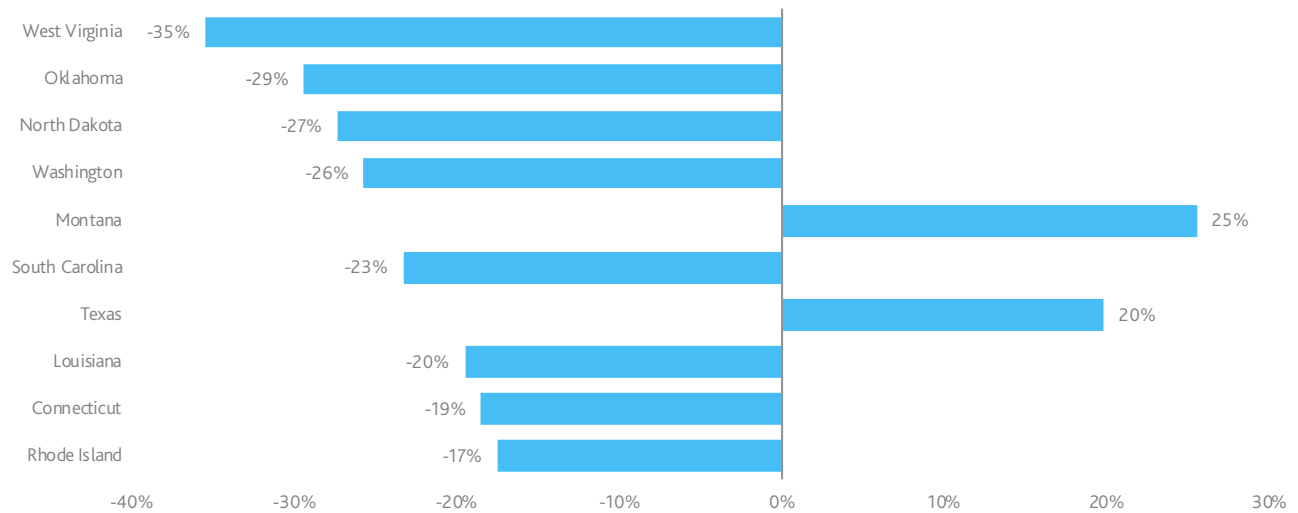
Stressed EDF Measure Analysis [8]

Figure 23 presents the stressed EDF measure forecast based on the Federal Reserve's Comprehensive Capital Analysis and Review (CCAR) scenarios. The graph is based on scores from the most recent statement for each company in CRD, no older than four years old. We calculate the annualized, nine-quarter EDF measure forecasts using a forecast date of March 2017 on the February 2017 CCAR scenarios.

Figure 23 Median, Ratio-Based Stressed EDF

---
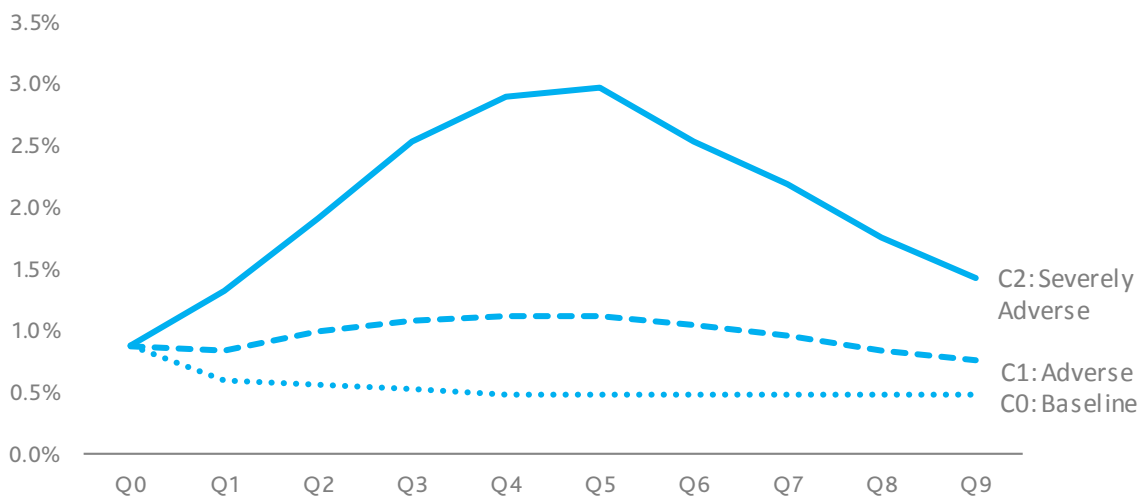
[8] The stressed EDF measure analysis is updated annually.

Conclusion

Overall, private-firm credit risk in the U.S. middle market has improved steadily over the past year and significantly since peaking in 2009. The market has shown credit soundness, as illustrated by the stable, rolling 12-month default rate and the median FSO EDF level. Changes in borrowers' financial positions during the past year have generally been positive, as seen in RiskCalc financial ratios (Figure 15).

Both the actual default rate and RiskCalc 4.0 One-Year CCA EDF value have continued to decrease steadily since peaking in 2009 (Figure 1), reversing the effects of the 2014–2016 commodities selloff. *Mining, Oil & Gas* has continued to display stress, but has seen significant improvements this year as oil prices rebounded and stabilized (Figure 16). During the past year, loan default rates have declined in states with high concentrations of energy companies, such as Oklahoma, North Dakota, and Louisiana (Figure 19).

Meanwhile, lenders have remained conservative. In each year since 2015, banks have downgraded more borrowers on their internal risk rating scales than upgraded (Figure 7), though more substandard-rated borrowers have been upgraded than downgraded (Figure 4).