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Credit Quality Trends Since the Great Recession

By Patrick Moore and Fal de Saint Phalle

Since the Great Recession, changes in underwriting and portfolio management techniques have affected credit quality. This article examines how changes to credit quality may affect industry portfolio performance during the next downturn. Data from key lender types and the overall industry identify key credit underwriting factors that clearly correlate to observed default rates.

Three New Technologies Whose Time Has Come in Equipment Finance

By Jeff Boots and Roderick Wilkins

Three key technologies hold promise for equipment finance firms looking to raise their quality of product and service deliveries while reducing cost. They are artificial intelligence, blockchain, and smart contracts. This article and a new video illustrate how both leasing companies and their customers will benefit from early adoption of these technologies.

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Since the Great Recession, changes in underwriting and portfolio management techniques have affected credit quality. This article examines how changes to credit quality may affect industry portfolio performance during the next downturn. Data from key lender types and the overall industry identify key credit underwriting factors that clearly correlate to observed default rates.

The equipment finance industry has fully recovered from the impact of the Great Recession, based on a number of metrics and factors examined from pre-recession to post-recession. However, there is growing interest in whether the industry is showing signs of declining portfolio health and whether the changes made to underwriting standards and portfolio management after the last recession will have a quantitative impact on the portfolio performance during the next downturn.

To help answer these important questions, PayNet created a special equipment finance data set for the years 2005 through 2016 made up exclusively of equipment finance loan and lease obligations. Using this data set — along with the Equipment Leasing and Finance Association (ELFA) annual *Survey of Equipment Finance Activity* (SEFA), Monthly Leasing and Finance Index (MLFI), and a variety of other industry and general sources — the authors investigated a number of criteria.

These criteria included equipment finance origination volumes; approval, conversion, and booking rates; yearly origination default rates; changes in borrower scores and other characteristics that correlate with default rates; and equipment finance portfolio performance trends.

Lastly, forecasted equipment finance portfolio default rates for baseline, adverse, and severely adverse scenarios using stress-test methodologies were also examined, to better understand how the current equipment finance portfolio can be expected to perform in the near future.

ORIGINATIONS

The equipment finance industry experienced expanding origination volumes overall since 2005, and particularly since 2009, as shown in Figure 1. Review of a number of industry indices from 2005 through 2016 shows that the volume of credit granted since the recession has exceeded previous levels — up approximately 46% (unadjusted for inflation), based on SEFA data. However, bank-owned, captive, and independent lenders have not all experienced this growth in the same way.

Bank-owned lenders have shown the most consistent performance and the highest growth rates since 2005, whereas the Independents showed the largest reduction from 2005 to 2009, but since then have shown the greatest rate of increase.

While industry origination volume has increased and ultimately exceeded pre-recession levels following 2009, industry approval rates have at least returned to pre-recession levels and have ranged between 71% and 76% since 2011, after having fallen to a low of 60% during the downturn. Conversion rates (booked divided by approved

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Editor's note: This article is based on an Equipment Leasing & Finance Foundation research report by PayNet titled The State of Credit Quality Today: Where We Have Been and Where We Are Going, *published in October 2017. The study is available at www.leasefoundation.org.*

applications by count) for 2016 reached 70% but have not yet fully recovered to pre-recession levels (over 78% in 2007).

Looking to the data on the three industry lender types, bank-owned lenders have the lowest default rates for all but the two years 2008 and 2009, and their 2.0% default rate for 2014 is considerably below the other two lender types.

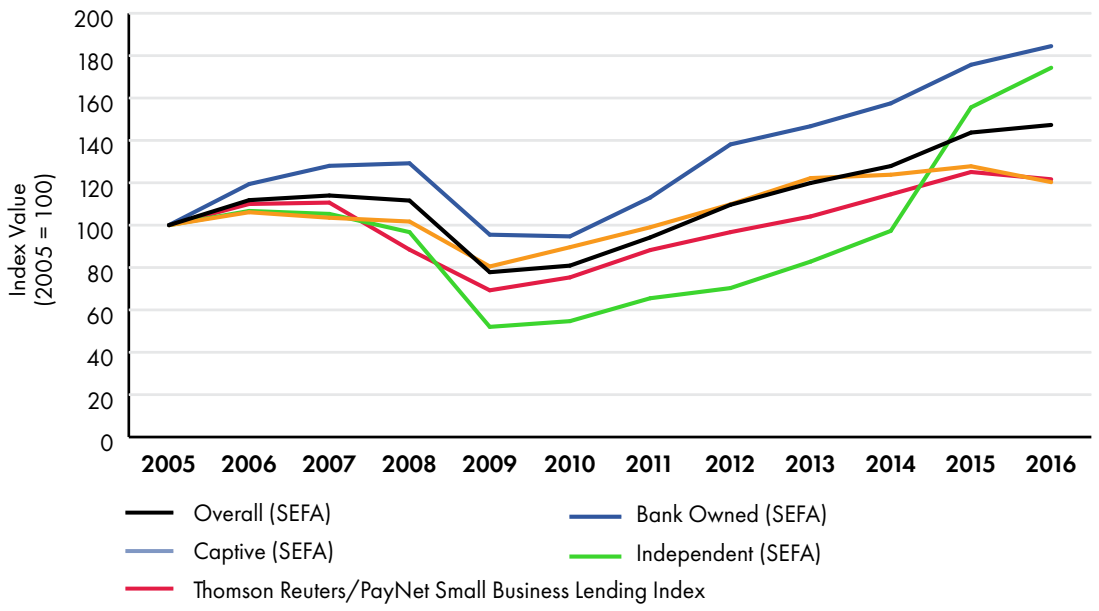
A lower percentage of applicants accept finance offers as they have more financing options; therefore, lower conversion rates likely indicate increased competition for high-credit quality borrowers. The net result is that booking rates (booked divided by all applications by count) have also not recovered to pre-recession levels, indicating little evidence of "irrational exuberance" in the granting of credit by this industry.

The performance of applications that were ultimately booked is also illustrative of trends since 2005. Twenty-four-month default rates for overall originations by year (as shown in Figure 2) peaked at 7.2% in 2007, then dropped gradually to 2.2% in 2013. It is important to note that the 2014 originations (the last year that can show 24-month default rates) show a slight reversal with an increase in the overall default rate to 2.5%.

Looking to the data on the three industry lender types, bank-owned lenders have the lowest default rates for all but the two years 2008 and 2009, and their 2.0% default rate for 2014 is considerably below the other two lender types. Captives show the highest default rates for all but three years, and are the highest for 2014 with a large bump up to 3.1%. Finally, Independents, which usually find themselves very close to the overall industry default rate, show a modest rise to 2.6% for 2014.

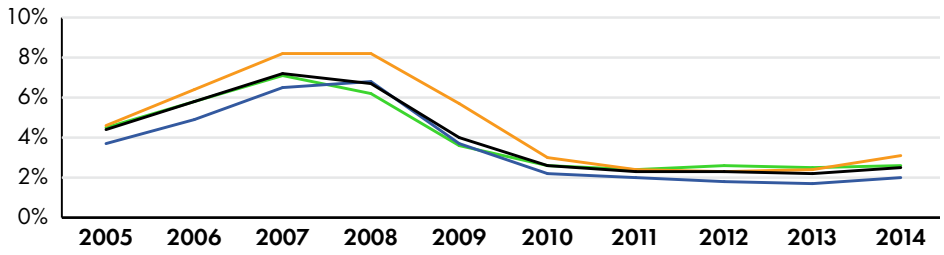
Origination and default trends by other key characteristics, such as PayNet MasterScore® (MSv2) and years in business, are also indicative of the drivers behind the equipment finance

Figure 1. New Business Volume Overall and by Lender Type, by Year



Source: ELFA annual SEFA reports and PayNet.

Figure 2. Twenty-four-month Default Rate by Year of Origination (Vintage), by Lender Type



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bank Owned	3.7%	4.9%	6.5%	6.8%	3.7%	2.2%	2.0%	1.8%	1.7%	2.0%
Captive	4.6%	6.4%	8.2%	8.2%	5.7%	3.0%	2.4%	2.3%	2.4%	3.1%
Independent	4.5%	5.8%	7.1%	6.2%	3.6%	2.6%	2.4%	2.6%	2.5%	2.6%
Overall	4.4%	5.8%	7.2%	6.7%	4.0%	2.6%	2.3%	2.3%	2.2%	2.5%

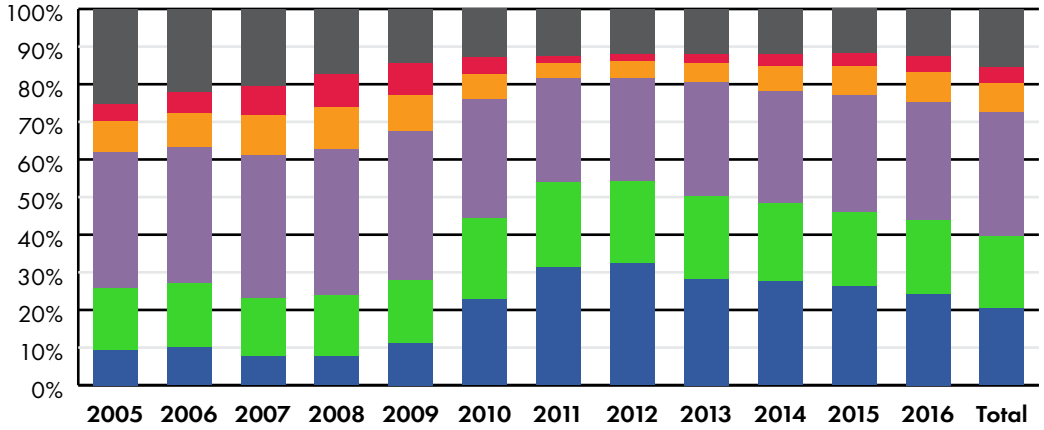
Source: ELFF *State of Credit Quality* report and PayNet data set.

industry's improved credit quality.[1] These measurements all show clear correlation with default rates and point to an industry moving toward lending in larger percentages to lower-risk applicants in the years since 2009 until at least 2014.

If we categorize 24-month default rates by year of origination (vintage) and aggregating credit quality by MSv2 scoring intervals into five quality tiers[2] each give a view of default behavior over time. A result of looking at default rates by credit quality tier is that the lowest quality tier over the period 2005 through 2014 has an average default rate more than 30 times higher than the highest quality tier. The MSv2 score proves to be an excellent discriminator of risk for all of these originations. More importantly, note the trends in overall distribution between the lowest and highest quality tiers in Figure 3.

Figure 3 illustrates that the percentage of originations in the low and below-average score tiers, based on volume, increased from 12.8% in 2005 to 20.1% in 2008 and then back to 12.4% in 2016, while the combined percentage in the high and above-average score tiers improved dramatically from 25.7% in 2005 to 43.9% in 2016. This validates that there was remarkable improvement in the quality of originations from 2005 to 2016.

Figure 3. Distribution of Dollar Originations by Credit Quality Tier, by Year of Origination



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
No Score	25.3%	22.1%	20.4%	17.2%	14.5%	12.8%	12.6%	12.2%	12.0%	12.0%	12.0%	12.4%	15.2%
Low	4.6%	5.5%	7.8%	8.7%	8.4%	4.7%	1.7%	1.7%	2.3%	3.1%	3.3%	4.2%	4.5%
Below Average	8.2%	9.1%	10.7%	11.4%	9.7%	6.7%	3.9%	4.5%	5.2%	6.8%	7.8%	8.2%	7.7%
Average	36.2%	36.2%	37.8%	38.7%	39.5%	31.4%	27.8%	27.5%	30.4%	29.8%	31.0%	31.2%	32.9%
Above average	16.3%	16.9%	15.6%	16.2%	16.7%	21.7%	22.6%	21.9%	21.9%	20.8%	19.7%	19.7%	19.2%
High	9.4%	10.1%	7.6%	7.7%	11.2%	22.8%	31.3%	32.3%	28.2%	27.5%	26.3%	24.2%	20.4%

Source: ELFF *State of Credit Quality* report and PayNet data set.

Note, however, the gradual reversion toward the historical mean, as represented by the Total column in Figure 3, reflecting a slightly higher risk profile in the last few years.

While credit score analysis provides an initial understanding of origination quality trends over the last decade, a fuller understanding can be achieved by also looking at borrower time in business. As shown in Figure 4, applicants with fewer than five years in business have on average overall default rates more than three times higher than those of businesses 20 years or older.

The general trend since the recession has been toward lower default rates by all borrower age groups, but it is worth noting the slight uptick in default rates across all borrower age segments in 2014.

Therefore, lenders that limited the amount of their exposure to borrowers with fewer years in business tended to have lower default rates, other factors being equal. As is noted in Figure 5, the equipment finance industry as a whole reduced the volume of originations to early-stage businesses (0 to 5 years in business) from 21.1% in 2005 to 13.2% in 2016. Conversely, the percentage of originations to later stage businesses (20 or more years in business) increased from 34.4% in 2005 to 60.7% in 2016. These results are consistent with more conservative underwriting standards.

A result of looking at default rates by credit quality tier is that the lowest quality tier over the period 2005 through 2014 has an average default rate more than 30 times higher than the highest quality tier.

Despite the greater share of originations in recent years coming from more mature businesses, from 2013 to 2016 the share of originations with newer businesses (0 to 2 years in business) increased slightly from 7.0% to 8.2%, indicating some return toward the historical mean with these borrowers.

To summarize the findings based on originations data, since the Great Recession default rates have declined for all risk tiers and a higher percentage of originations are lower risk than prior to the downturn.

Furthermore, an examination of the borrower time in business data by lender type shows that this overall favorable trend differs between the three lender types. As is shown in the study in considerable detail, bank-owned lenders increased their percentage of later stage, lower risk entities, especially among those with more than 20 years in business, and captured almost 55% of these borrowers in 2016 compared to less than 40% in 2005 and 2006 prior to the recession.

However, Captives' market share based on borrowers' years in business is similar to historical levels for 2016 originations. Finally, Independents actually exhibited a shift to higher-risk borrowers, with a lower percentage of later-stage borrowers. Accounting for most of the rise in borrowers 0 to 2 years in business, Independents held nearly 40% market share of these borrowers in 2016, up from 26% as recently as 2010.

To summarize the findings based on originations data, since the Great Recession default rates have declined for all risk tiers and a higher percentage of originations are lower risk than prior to the downturn. However, in 2015 and 2016 there have been slight shifts back toward a larger share of industry volume coming from newer and lower-quality borrowers. Subsequently, as discussed in the next section, portfolio delinquency and default rates have increased measurably for the first time since that recession and have generally been rising since 2015.

PORTFOLIO PERFORMANCE

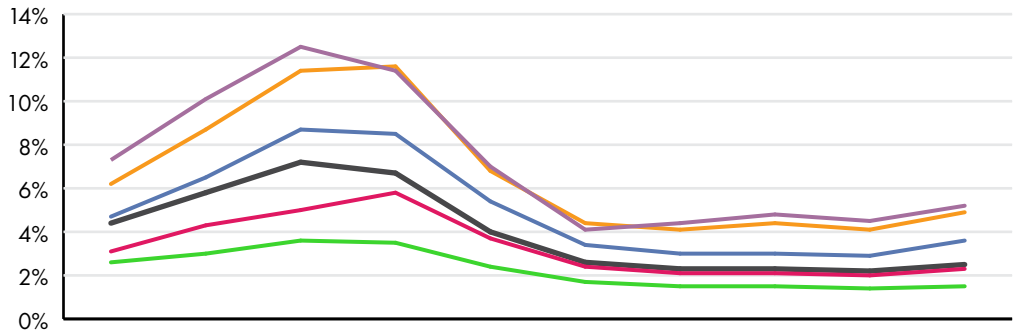
Another method of gauging impacts related to changes in credit quality through the cycle is by examining portfolio performance metrics. Overall portfolio default rates as measured by PayNet's Small Business Default Index peaked at 6.35% at the time of the recession. During the recovery, as shown in Figure 6, default rates declined from 2010 through 2014 and reached a historical low of 1.49%.

Since then, default rates have increased, and most recently reached 1.88%, still lower than pre-recessionary levels that were over 2.5%. These trends are consistent with other delinquency measurements such as the MLFI – Aging of Receivables Over 30 Days, which is also shown in Figure 6. One metric that does show a more dramatic recent increase is the MLFI – Charge-Off metric, where the April 2017 charge-off rate was three times higher than the historical low rate seen in late 2014 (0.47% compared to 0.15%).

This performance is consistent with the average MSv2 of open accounts at the end of each year from 2005 through 2016. Figure 7 tracks the average dollar-weighted MSv2 of year-end open contracts for this time period by lender type.

The equipment finance portfolio prior to the recession was much

Figure 4. Twenty-four-month Default Rate by Year of Origination (Vintage), by Borrower Years in Business

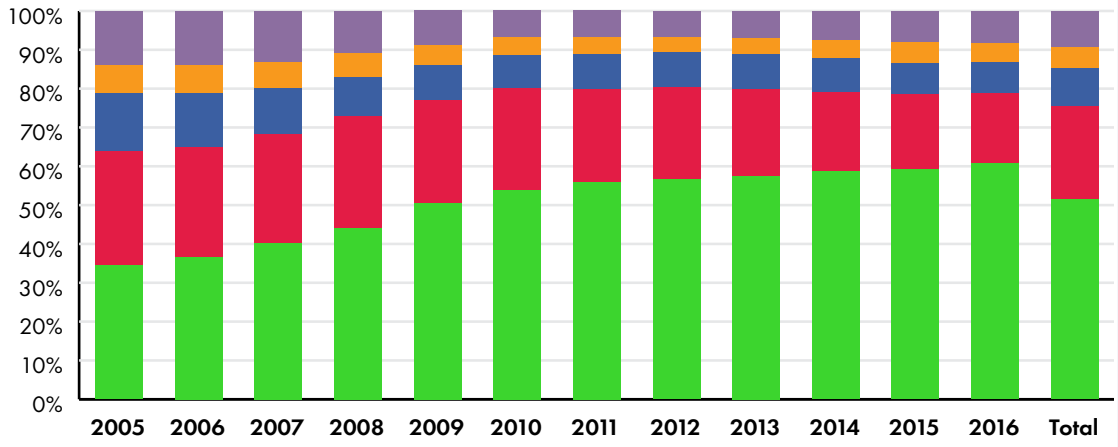


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0 to 2	7.3%	10.1%	12.5%	11.4%	7.0%	4.1%	4.4%	4.8%	4.5%	5.2%
2 to 5	6.2%	8.7%	11.4%	11.6%	6.8%	4.4%	4.1%	4.4%	4.1%	4.9%
5 to 10	4.7%	6.5%	8.7%	8.5%	5.4%	3.4%	3.0%	3.0%	2.9%	3.6%
10 to 20	3.1%	4.3%	5.8%	5.8%	3.7%	2.4%	2.1%	2.1%	2.0%	2.3%
20+	2.6%	3.0%	3.6%	3.5%	2.4%	1.7%	1.5%	1.5%	1.4%	1.5%
Overall	4.4%	5.8%	7.2%	6.7%	4.0%	2.6%	2.3%	2.3%	2.2%	2.5%

Note: Lower bound is inclusive; upper bound is exclusive (i.e., 0 to 2 does not include 2 years; 2 to 5 does).

Source: ELFF *State of Credit Quality* report and PayNet data set.

Figure 5. Distribution of Dollar Originations by Credit Quality Tier, by Borrower Years in Business, by Year of Origination

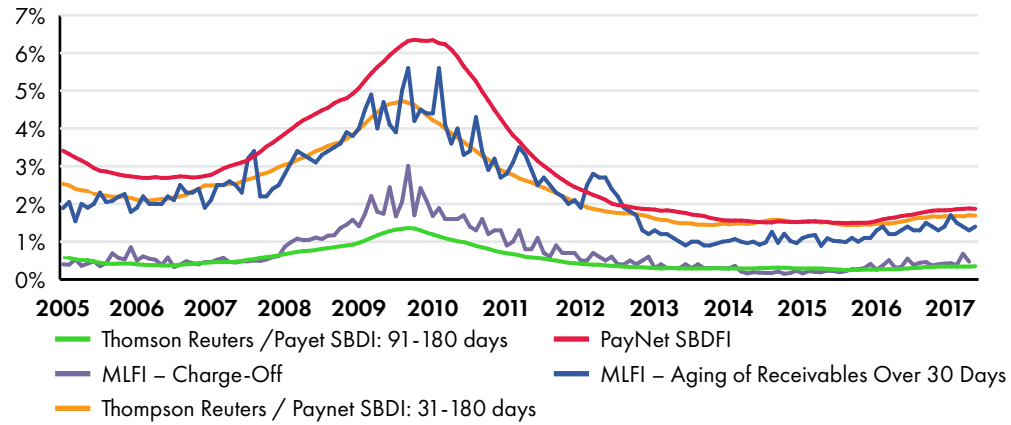


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
0 to 2	14.0%	13.9%	13.1%	10.8%	8.8%	6.9%	6.7%	6.6%	7.0%	7.6%	8.2%	8.2%	9.3%
2 to 5	7.1%	7.2%	6.8%	6.2%	5.3%	4.7%	4.4%	4.1%	4.2%	4.7%	5.2%	5.0%	5.4%
5 to 10	15.0%	13.8%	11.9%	10.1%	9.0%	8.6%	9.1%	8.8%	8.9%	8.5%	8.2%	7.9%	9.8%
10 to 20	29.5%	28.4%	28.0%	28.7%	26.4%	26.1%	23.9%	23.9%	22.4%	20.5%	19.3%	18.1%	24.0%
20+	34.4%	36.6%	40.2%	44.1%	50.6%	53.9%	55.9%	56.6%	57.5%	58.7%	59.2%	60.7%	51.4%

Note: Lower bound is inclusive; upper bound is exclusive (i.e., 0 to 2 does not include 2 years; 2 to 5 does).

Source: ELFF *State of Credit Quality* report and PayNet data set.

Figure 6. Indices Tracking Historical Portfolio Performance



Source: PayNet and ELFA.

riskier than in recent years, as illustrated by the trend of average portfolio MSv2 (Figure 7). MSv2 is calibrated such that a 20-point score difference doubles the odds of default. Given that the equipment finance portfolio had an average score of 674 as of December 31, 2007 — 18 points lower than the average score as of December 31, 2016 — the portfolio had roughly double the default risk in 2007 compared to 2016.

The portfolio risk remained relatively stable from 2011 to the end of 2014, but the average score shows a decline in each of the last two year-ends, and a drop to 692 as of December 31, 2016. This trend indicates that increased risk associated with new originations, noted earlier, is starting to be reflected in the equipment finance portfolio.

Looking at lender type, bank-owned lenders have seen their portfolios closely resemble the overall risk profile. Captives show upticks in average score from 2009 to 2012, moving from the industry average score of 683 to an above-industry average score of 710.

Much of this can be attributed to transportation and construction borrowers defaulting at higher rates than other segments in 2008–2010 and thus falling out of the portfolio, but also to the impact of the agriculture "supercycle" that created favorable conditions following the recession in that industry. Lastly, Independents are below the industry average score every year-end except for 2009.

Looking at lender type, bank-owned lenders have seen their portfolios closely resemble the overall risk profile. Captives show upticks in average score from 2009 to 2012, moving from the industry average score of 683 to an above-industry average score of 710.

Improvements in monitoring accounts, better structuring of transactions, and greater

Finally, this review of portfolio performance shows that the equipment finance industry risk orientation has increased in the last two years (2015 through 2016), which is similar to the quality and performance trends for originations.

care in assessing residuals and underwriting obligor risk certainly have helped prevent some defaults and improve recovery rates when defaults do occur. In fact, as Kevin Prykull, SVP and credit underwriting executive from PNC Equipment Finance, states,

> The benefit of heightened standards for a regulated bank leasing company have lifted the bar on our processes and procedures in assessing risk. This has resulted in credit underwriting that is much deeper, better structured, and more disciplined.

He goes on to comment,

> With the implementation of quality assurance and quality control functions within the organization, portfolio management has become more intensive, with rigorous periodic credit reviews, frequent risk ratings updates, exception monitoring, etc., to ensure proper and focused adherence to our risk-appetite framework.

Regarding changes made in asset management, Jeffry Elliott, senior managing director of Huntington Asset Finance, commented, "We saw real improvement in asset management. I believe this was due to the specific residual committee we established. That led to improvements in our valuation process."

Finally, this review of portfolio performance shows that the equipment finance industry risk orientation has increased in the last two years (2015 through 2016), which is similar to the quality and performance trends for originations. The industry overall has shown a shift toward booking a slightly higher share of volume from lower-quality borrowers. Performance has declined somewhat over this time period, with portfolio default rates, delinquency rates, and MLFI charge-off rates all increasing.

All that said, however, portfolio performance and quality in the most recent periods remains stronger than prior to the recession, thanks both to changes in underwriting and to improvements in areas like portfolio management and asset valuation. Members of the equipment finance industry should find it instructive to use these tables to compare to their own origination characteristics and portfolio performance metrics, to assess the degree of deviation.

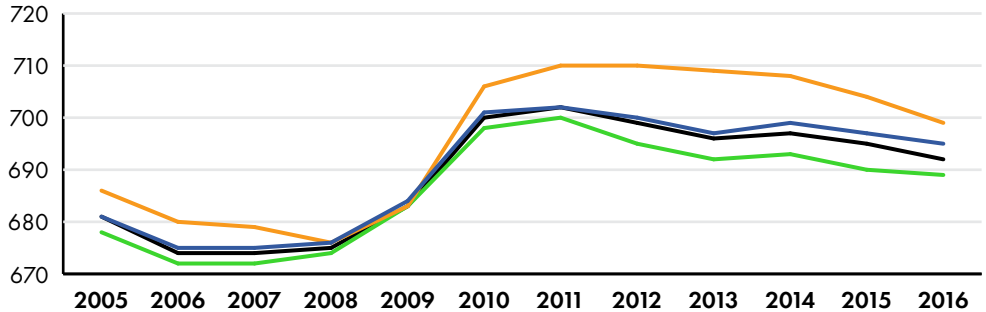
PERFORMANCE FORECASTS

Recent underwriting, credit quality, and portfolio performance trends all point to tendencies that can be expected in the very near future. Additionally, to more fully understand how the current equipment finance portfolio can be expected to perform in the future, forecasting models were run to provide a quantitative assessment of what can be expected from a starting date of January 1, 2017.

This evaluation utilized two separate models developed by PayNet for forecasting future performance expectations: PayNet's AbsolutePD® Stress Test Simulator and PayNet's AbsolutePD® model. (PD stands for probability of default.) The Stress Test Simulator was used to examine the Federal Reserve Bank's three economic scenarios for stress-testing built on a slightly broader data pool, and the AbsolutePD model was used to examine these scenarios for the equipment finance data set to discern the baseline impact by lender type.

Projections from the Stress Test Simulator show the rolling

Figure 7. Average Dollar-Weighted PayNet MasterScore v2 of Open Accounts at Year-End



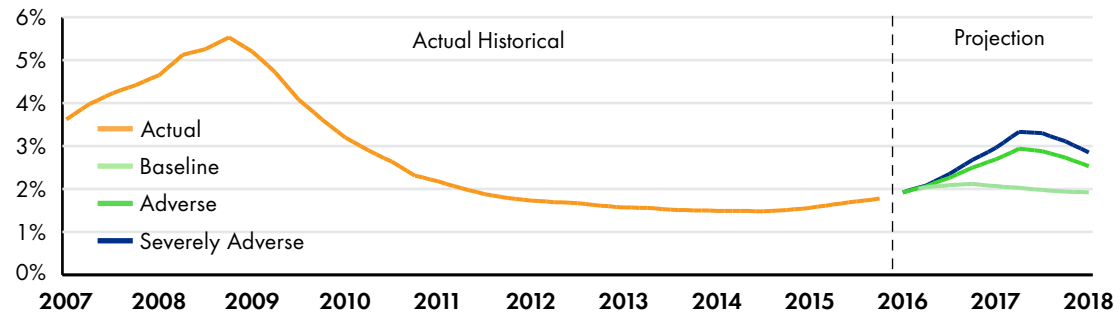
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bank Owned	681	675	675	676	684	701	702	700	697	699	697	695
Captive	686	680	679	676	683	706	710	710	709	708	704	699
Independent	678	672	672	674	683	698	700	695	692	693	690	689
Overall	681	674	674	675	683	700	702	699	696	697	695	692

Source: ELFF *State of Credit Quality* report and PayNet data set.

12-month projected default rates based on the Federal Reserve Bank's three scenarios published in February 2017 (Figure 8). The adverse scenario assumes a meaningful pullback on the rate of growth, with recessionary economic conditions present, resembling the 1990–91 recession. The severely adverse scenario incorporates recessionary economic conditions, but along the lines of the Great Recession.

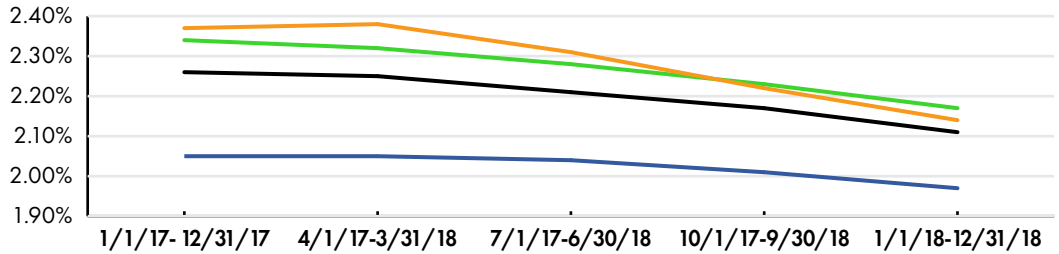
The Stress Test Simulator projects peak default rates for the baseline scenario of 2.12% and for the severely adverse scenario of 3.33%. These scenario default rate results are substantially below the actual industry default rates during the Great Recession, which had a peak level rolling 12-month default rate of 5.5% in 4Q09.

Figure 8. Industry Historical Default Rate with Scenario Projections from PayNet Stress Test Simulator



Source: PayNet Stress Test Simulator.

Figure 9. Forecasted 12-Month Default Rates by Equipment Finance Lender Type



	1/1/17- 12/31/17	4/1/17-3/31/18	7/1/17-6/30/18	10/1/17-9/30/18	1/1/18-12/31/18
Bank Owned	2.05%	2.05%	2.04%	2.01%	1.97%
Captive	2.37%	2.38%	2.31%	2.22%	2.14%
Independent	2.34%	2.32%	2.28%	2.23%	2.17%
Overall	2.26%	2.25%	2.21%	2.17%	2.11%

Source: ELFF *State of Credit Quality* report and PayNet data set.

The AbsolutePD model was used to look deeper into the equipment finance industry, both overall and by lender type, where differences between the baseline scenario-adjusted projections for equipment finance industry default rates are seen (Figure 9).

Notably, Captive probabilities of default (PDs) are the highest for the four quarters ending December 31, 2017, (2.37%) and March 31, 2018, (2.38%), but they drop the most in the later periods and actually have lower projected default rates than Independents for the year ending 2018 at 2.14%. Bank-owned PDs are significantly lower than the other lender type PDs, likely due to the higher quality bookings in recent years noted earlier, moving from 2.05% for the 2017 calendar year to 1.97% for the 2018 calendar year. Lenders can use the projected default rate trends by lender type in tandem with their own organization's data and performance trends to estimate their own near-term baseline expectations.

These scenario default rate results are substantially below the actual industry default rates during the Great Recession, which had a peak level rolling 12-month default rate of 5.5% in 4Q09.

CONCLUSION

Overall since the Great Recession, industry credit quality has been unusually high and default rates unusually low, due to a unique combination of several events that constitutes a triple-witching hour and then some. Weaker borrowers were wiped away by the Great Recession while surviving borrowers became more reluctant to incur debt unless it was absolutely necessary and affordable. Meanwhile, the lenders were being more cautious than usual, generally having losses

— and, in some cases, internal management and regulatory pressure — fresh in their minds.

The Great Recession, in all likelihood the worst economic event of our lifetimes, created optimal conditions in which to extend credit for the equipment finance industry.

Ultimately, the economic environment turned out to be better than expected. Often the best time to lend is after a downturn. The Great Recession, in all likelihood the worst economic event of our lifetimes, created optimal conditions in which to extend credit for the equipment finance industry. A continuation of these temperate conditions is doubtful, and likely over time there will be regression to the mean, but that regression seems to be progressing slowly.

Methodology

PayNet data for the study was extracted from PayNet's proprietary database of over 23 million business loans and leases worth more than $1.5 trillion, as reported monthly by over 300 U.S. commercial finance, bank, and fintech member-lender institutions. The database covers the full spectrum of borrower commercial industries, borrower types, and sizes.

The equipment finance data set used for the study is based on 7.6 million equipment finance contracts originated from 2005 through the first quarter of 2017. In order to allow sufficient time for contracts to perform, the portions of the study that discuss default rates are restricted to contracts originated from 2005 through 2014, providing almost 6 million contracts with nearly 250,000 defaults. Additionally, only data from lenders active in the equipment finance and leasing space are included in this study.

For further details on the equipment finance data set creation, default rate definition, lender group and lender types used, PayNet scoring models and projections used (PayNet's MasterScore v2, AbsolutePD and AbsolutePD Stress Test Simulator), and ELFA's Monthly Leasing and Finance Index (MLFI) and annual *Survey of Equipment Finance Activity* (SEFA), see the appendix of the October 2017 Foundation Study by PayNet, titled *The State of Credit Quality Today: Where Have We Been and Where We Are Going,* available at www.leasefoundation.org.

Further information on PayNet's models and indices, including white papers and further details on methodologies, can also be found at http://paynet.com and https://sbinsights.paynetonline.com.

Further information on the annual SEFA report and the MLFI monthly report can also be found at www.elfaonline.org/data/data-home.

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Endnotes

1. The complete study did examine other factors at origination, like borrower revenue size, but these additional analyses were not included in this article for the sake of brevity.

2. The five quality tiers are determined by assigning every contract in the analysis to a specific MSv2 range based on the score at origination for that contract's borrower. The MSv2 range for each quality tier is: Low, 450 to 639; Below Average, 640 to 659; Average, 660 to 699; Above Average, 700 to 719; and High, 720 to 800.

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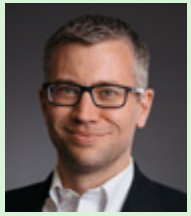

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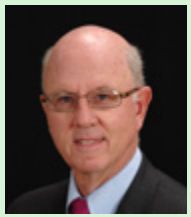

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Three New Technologies Whose Time Has Come in Equipment Finance

By Jeff Boots and Roderick Wilkins

Three key technologies hold promise for equipment finance firms looking to raise their quality of product and service deliveries while reducing cost. They are artificial intelligence, blockchain, and smart contracts. This article and a new video illustrate how both leasing companies and their customers will benefit from early adoption of these technologies.

The equipment finance industry has rarely been recognized as a technology leader, particularly when compared to peer industries and certainly not when viewed against related consumer finance practices. Consumers benefit from advances in automation and business intelligence in ways that would greatly benefit lessees and borrowers in the industry.

A recent study by the Equipment Leasing and Finance Foundation resulted in a comprehensive video defining how three new technologies should be addressed proactively and without delay. The study and this article focus on three key technologies: artificial intelligence (AI), including a core component via robotic process automation (RPA); blockchain; and smart contracts.

All three of these technologies have reached a level of maturity that will trigger a tipping point for their adoption. The technologies highlighted here can all be used now — very much to the advantage of the industry's clients and those who boldly dare to adopt them.

The most recent ELFA Business Technology Performance Index (BTPI) survey results indicated that one-third or less of industry players is actively reviewing these technologies. This development, driven by market expectations as well as regulatory and cost pressures, is trending upward. Over the next five years the technologies will be increasingly visible, as equipment finance firms look to raise their quality of product and service deliveries while reducing cost.

Readers should view the video vignette at www.leasefoundation.org/industry-resources/new-technologies, as it complements this article. Together, they illustrate the power available to the industry through a thoughtful combination of the three technologies in focus here. As we all know, data is just that — information. The trick is to turn data into useful knowledge and make it available to those who own it and ultimately can best use it — and profitably.

The video presents three examples of how the equipment leasing and finance industry will work in the future and answers three key questions:

1. What if a farmer could secure a more powerful combine, based on an offer from a dealer that meets her needs *exactly* — with a financing structure based on her business model and revenues?
2. What if an equipment finance company could put buyers and sellers together by giving the dealers insights about buying patterns that allow the finance company to provide tailored offerings that win the business?
3. What if the equipment finance company's servicing system could automatically create the contract's terms and conditions without any human intervention?

Let us further examine the three technologies.

Editor's note: This article is based on an Equipment Leasing & Finance Foundation research grant project titled New Technologies, *a video produced by Capgemini America Inc. Released in October 2017, the video may be accessed at www.leasefoundation.org/industry-resources/new-technologies.*

Better visibility of leasing customers and the landscape in which they operate will support enhanced risk pricing and more accurate restrictive covenants.

ARTIFICIAL INTELLIGENCE

There is great deal of excitement surrounding artificial intelligence (AI) — but it is accompanied by ample measures of uncertainty and fear. The fear is that technology will replace the jobs and tasks that people perform, or that workers are going to be engineered out of all usefulness due to machines.

However, the reality is that AI is not likely to be the end of anything. Rather, it is the start of something new and exciting, holding untapped potential not only for businesses but their customers as well. Workers will be freed from repetitive and dull duties as tasks become automated — enabling them to concentrate on the more interesting and complex aspects of the business where value can be added.

AI is both programmatic and cognitive. Programmatically, AI/RPA focuses on the delivery of repetitive and time-consuming tasks at greatly reduced cost. Cognitively, AI capabilities augment an equipment finance company's human capital by providing the client and customer with individualized products and services matched to their needs through intelligent customer profiling and product matching.

Implicit within AI is machine-learning of what works best and when.

Example: A Farm Equipment Lease

The video begins at the outset of a fairly typical farm equipment leasing transaction. Incorporating data from industry sources and the personal private information provided by the actual customer, the example uses AI to build a knowledge base from which the equipment finance company can:

- provide industry and customer-based insights to dealers, assisting them in offering individual marketing campaigns to prospects, with the right product and service combinations at the right time and price;
- build specific profiles for the individual customer; and
- manage risk more actively through gaining improved customer insights. Better visibility of leasing customers and the landscape in which they operate will support enhanced risk pricing and more accurate restrictive covenants.

The software can almost think and is able to learn as it goes. It is essential to recognize that harnessing AI's potential involves not just thinking about technology toolkits but also the processes to which AI is applied, along with the desired business outcomes. Properly implemented, AI should play a core role in the functioning of all leasing organizations.

Further into the transaction portrayed in the video, we see that once a successful sale has been made and a finance package accepted, RPA is deployed to augment the finance company's ability to execute.

Combined with AI, the technologies rapidly perform much of the repetitive grunt work involved in the credit-granting process, as they capture and validate data and make it easier for credit officers to evaluate and mitigate the risks of each transaction.

BLOCKCHAIN

Blockchain is a trustworthy network in which the characteristics of almost any asset or data type are stored and validated by the network. Ownership rights can be exchanged without the need for intermediaries.

Blockchain has mistakenly become closely identified with bitcoin, whose name appears often in the media. The difference is fairly simple. Bitcoin is a crypto-currency — a means of exchange outside the everyday fiat notes issued by most governments. The first blockchain was developed to support the coinage; hence, the frequent confusion of the two.

In regular blockchain, data is open to be examined by any network member, whereas bitcoin data is anonymous. Blockchain networks rely on specific sources to verify transactions (known as "machine consensus").

Public and private networks are the principal types of blockchains. The difference between those two lies in the participants and in what entity executes the validations (consensus) and maintains the shared ledger.

Public Blockchain

A public blockchain network is open to anyone. These tend to be expensive and complex. As Praveen Jayarandam of IBM writes:

> One of the drawbacks of a public blockchain is the substantial amount of computational power that is necessary to maintain a distributed ledger at a large scale. More specifically, to achieve consensus, each node in a network must solve a complex, resource-intensive cryptographic problem called a *proof of work* to ensure all are in sync. Another disadvantage is the openness of public blockchain, which implies little to no privacy for transactions and only supports a weak notion of security. Both of these are important considerations for enterprise use cases of blockchain.

Private Blockchain

A private blockchain, on the other hand, is joined by invitation only. Membership qualifications are highly specific

and well known to participants. Digital identities are fully trusted and allow the secure sharing of data.

An extension of the private blockchain is federated or consortium blockchains. These operate under the leadership of a group. As opposed to public blockchains, they do not allow any person with access to the internet to participate in the process of verifying transactions.

Federated blockchains are faster (higher scalability) and provide more transaction privacy. Consortium blockchains are mostly used in the banking sector. The trust (machine consensus) in the process is controlled by a preselected group. For example, in a consortium of 15 financial institutions, each of which operates a node, the trust rules established at the outset require at least 10 members to sign every block for the block to be valid.

The right to read the blockchain may be either public or restricted to the participants. Any permitted member can be sure of the validity of every transaction, thereby removing the need for intermediaries.

The first time an international payment on a blockchain crossed the wires, the transaction was completed in a matter of seconds instead of hours. Blockchain with distributed ledger technology (DLT) is a long-term prospect. Three years ago it seemed potentially revolutionary, but the consensus premise behind the technology was more public than banks were comfortable with.

However, private blockchains help close the information gaps that make a multistage settlement a problem. With blockchain, each bank could potentially verify the payment information simultaneously. Then, if all relevant parts of the chain provide validation, the transaction could settle instantly, making for a more binary — and thus less uncertain — payment process.

SMART CONTRACTS

The video next explains how the third of the emerging technologies, smart contracts, are used by the finance company. Smart contracts are constructed to establish trust across all the stakeholders involved in documenting a solid finance transaction. Documentation becomes highly automated, along with transaction closing. There is less room for fraud and error, with increased speed and certainty.

Smart contracts are tools to enable the exchange of money, property, shares, or any asset of value in a transparent, conflict-free way while avoiding the services of a middleman. Technically, a smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract.

Smart contracts enable the performance of credible transactions without third parties. These transactions are trackable and irreversible. Proponents of smart contracts claim that many kinds of contractual clauses may be made partially or fully self-executing, self-enforcing, or both.

Proponents of smart contracts argue that they provide more surety than traditional contract law, in addition to reducing the costs associated with transactions.

If, for instance, the financing firm and the equipment dealer have joined a mutual consortium blockchain where a smart purchase contract is in place, then the finance company can acquire and pay for the farmer's leased equipment via the blockchain without the need to exchange any paper documentation.

Standard terms and conditions, warranties and representations, and so forth are in place and do not need to be negotiated. Thus, smart contracts add speed and certainty as well as reduce cost.

Beyond the immediate simple transaction, the video envisions a world where customers have truly become a "market of one." This may be part perception and part reality in that the product offerings feel exclusive, tailored, and unique. The equipment finance company sits at the center of a complex web of capabilities assembled to meet the needs of the dealer, its customers, and the customers' customers.

The Farm Equipment Lease

The video provides a real-life example of a farmer whose initial desire is simply to replace her aging harvesting equipment. She reached out to her finance company, which put her in touch with a local dealer for help in finding the right machinery.

Standard terms and conditions, warranties and representations, and so forth are in place and do not need to be negotiated. Thus, smart contracts add speed and certainty as well as reduce cost.

From this basic and common transaction, we begin to see a broader world where intelligent use of technology presents the farmer with the products and services likely to be most useful to her. She is presented with financial options to purchase these and put them to use in a convenient and rapid manner.

Not only is the farmer enabled to meet her original objectives but she also is provided with insights and services allowing her to offer a superior level of performance to her existing

Modularize to minimize downtime, build iteratively, carefully control technology releases, and, above all, emphasize the importance of engaging the entire organization.

customers. Openings to new markets appear, making this a win-win-win situation and illuminating just what might be possible in the equipment finance industry if these three technologies are used together.

THINKING ABOUT THESE TECHNOLOGIES AS INDIVIDUAL FIRMS AND AS AN INDUSTRY

What conclusions should be drawn here? The first, of course, is that the technologies are set to enhance and transform the way equipment finance enterprises and their employees manage their processes and serve their customers.

The second conclusion is that technology reaches its fullest potential when it is approached with equal intelligence. AI, blockchain, and smart contracts need to be woven into an organization, not just bolted onto it. This means taking time before any implementation to understand the exact needs of the business, the efficacy of specific processes, the extent of a current installed technology base, and the capabilities of the workforce.

How should finance companies approach implementation? Firms need to start small and learn. Select the right processes, and standardize these before they are automated. Modularize to minimize downtime, build iteratively, carefully control technology releases, and, above all, emphasize the importance of engaging the entire organization.

The Case for an Industry-Based Approach

As articulated earlier, AI and RPA can quickly become key enablers, allowing equipment lessors to differentiate themselves from their peers. Even though industry members may want to be perceived as individualistic, common standards benefit the entire industry.

Much of the process flow and the data within the industry's firms is common to all and would benefit from standardization. The industry as a whole can develop a consensus on common standards without violating competition and antitrust rules. This will, in turn, support the implementation of these technologies.

Some examples of this include:

- The development of common equipment leasing industry data expressions. In the mortgage industry today, the Mortgage Industry Standards Maintenance Organization sets the standards. MISMO developed a common data language for exchanging information for the residential finance industry. Today, MISMO standards are accepted and deployed by every type of entity involved in creating mortgages, and they are required by most regulators, housing agencies, and the government-sponsored enterprises that participate in the industry. Use of MISMO's standards has been found to lower per-loan costs, improve margins, reduce errors, and speed up the loan process by reducing manual, paper-based processes while creating cost savings for the consumer. MISMO is a wholly owned subsidiary of the Mortgage Bankers Association.
- The development of common standard terms and conditions for selected smart contract types where there already is consensus on industry standards
- The development of industry blockchains for payment and/or settlement transaction processing to agreed-upon standards

Suggested Steps and Roadmaps

Distributed ledgers offer a higher degree of trust and reduced risks. Contracts or records stored on blockchains or permissioned ledgers may eliminate the need for a central intermediary to provide trust in the system. For markets that do not use intermediaries, distributed ledger technology still adds a higher degree of trust than current operations.

Consideration should be given to establishing an ELFA standards body, so that members can create industry standards for implementing standard equipment lease and loan documentation as a smart contract. This makes sense where long-established and well-controlled relationships exist across specific industry subsectors, between lease finance firms and their funders, dealers, and clients.

In addition, those standards would be helpful when asset types are well known and the terms and conditions of lease contracts are well understood. Smart contracts offer an attractive accelerator, enhancing efficiency and reducing risk. Here, an ELFA standards body could take the first incremental steps to test the acceptability of this concept.

Similarly, using the model established by MISMO as explained above, ELFA's standards body could develop a common data language for exchanging information for the equipment finance industry. This model would prove a significant enabler for the acceptance of these technologies within the industry and among its broader stakeholders.

If customers are satisfied and equipment finance firms have automated, secure technology to extend the lifetime of a customer, surely finance providers will prosper in this environment.

IN SUMMARY

To deliver the experience demanded by both direct and indirect customers, the equipment finance industry's people, processes, and supporting technology must all be refocused and coordinated. Too many equipment finance firms rely on processes and technology that have become purpose specific, that are often hard or slow to change, and that now impose constraints although they once were enabling. We must loosen these bonds.

Customers of today and most certainly of tomorrow must be able to communicate with firms that provide equipment financing by any means the customer chooses, at any time of day. Customers should be free to switch from one channel to another at will and seamlessly, to leave and return when they wish, rejoining at the previous point of departure.

In other words, customers starting the process online should be able to switch to a chat session or speak to a call center. If they need to interrupt the process for a while, they should be able to resume where they left off.

This scenario is now possible with these new technologies. AI enables sellers to anticipate the needs of buyers to tailor offerings that meet their needs. Providers need to interact with them in ways that allow them to assess their current individual status as well as their probable needs, and to match those with offerings, or combinations of offerings, that are specific to that customer.

First, a Strong Foundation

Equipment leasing and finance firms must have a strong foundation in place to harness the benefits of artificial intelligence, blockchain, or smart-contract initiatives. Enabling these technologies starts with having stable and reliable front- and back-office systems. The previous year's BTPI report delved into the need for back-office digitization and a big-data strategy.

Technologies that invoke images of robots and artificial intelligence may seem the stuff of science fiction. But the benefits are clear when a buyer can be presented with exactly the right financing options in real time because of AI.

While a firm's relying on a public blockchain to manage contract data (even as simple as UCC filings) may appear as if giving up control, instead the firm is enabling a process that is too often done expensively today, and without the certainty that the technology provides.

The use of a smart contract to transact a complex end-of-lease extension without a salesperson getting on a plane to visit face to face may make a leasing firm fear that the relationship aspect of the business is eroding.

But is it really eroding? If customers are satisfied and equipment finance firms have automated, secure technology to extend the lifetime of a customer, surely finance providers will prosper in this environment.

These emerging technologies will significantly enable other technologies and support that leasing businesses will soon be requiring. The narrator concludes the video by asking, Are we ready?

- Is the equipment finance industry ready to move forward with these technologies?
- Will firms recognize that the greatest risk of all may be that of standing still?
- Will early adopters emerge, creating a landscape where 21st century technology and thinking drives competition?

In the next five years, the firms that thrive in the equipment leasing industry will be those employing these new technologies, in the process discarding their fear, uncertainty, and doubt. For those that hesitate, their fear of change will be eclipsed by "fear of missing out" as the technology-driven, competitive landscape evolves.

In short, for firms that do not act now to implement these technologies, "missing out" will be their reality. Fintech players will emerge to challenge today's equipment lessors for their market share. The time is now.

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