OakNorth CREDIT INTELLIGENCE | CELENT

OakNorth Credit Intelligence

Reinventing Credit Analysis and Monitoring with Machine Learning

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Forward

Since 2015, OakNorth has been on a mission to empower growth businesses to make the world a more interesting, dynamic, and diverse place to live.

Growth businesses are the change makers, the job creators, the productivity drivers, and the home builders who with $1 of funding, will put another $4 back into the economy. They are the backbones of economies and communities globally.

We want to ensure that every one of these businesses is able to obtain fast, flexible debt finance and that banks are equipped with the technology to do this at speed, at scale and securely.

We work with visionary banks around the world, including our own bank in the UK, OakNorth Bank plc, to build the future of commercial lending and help hundreds of thousands of growth businesses scale.

To explore this further, OakNorth has partnered with Celent – a leading research and advisory firm specialising in Financial Services – to produce a 'Solution Brief', detailing how OakNorth is doing this through deploying the OakNorth (ON) Credit Intelligence Suite.

The research breaks down the three central components to the ON Credit Intelligence Suite – Portfolio Insights, Credit Analysis and Loan Monitoring, before detailing how each of these enables lenders to *Lend Smarter, Lend Faster, and Lend More*.

The report then concludes by specifying what the opportunities are for banks who are looking to deploy the software moving forward and how the ON Credit Intelligence Suite differs from other legacy credit analysis and portfolio monitoring tools.

In addition to Celent's findings, Sean Hunter, OakNorth's Chief Information Officer shares his latest insights on how and why a data driven approach is the key to profitable growth in commercial lending. In addition, he also touches on how we're currently seeing fast movers already anticipating the bounce-back of the economy, with more demand and competition to provide business loans than ever.

As Sean Hunter details on the next page, for profitable growth, banks need to differentiate themselves and go where the competition is not. That doesn't mean taking on more risk, it means having the ability to lend to overlooked market sectors and business types - ones which are good credits but may be difficult for other lenders to confidently take on as they don't have the data or analytics to make an informed decision.

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A data-driven approach to profitable growth in commercial lending

BY SEAN HUNTER,
CIO AT OAKNORTH

Fast movers are already anticipating the bounce-back of the economy: we've heard from one bank that there is more demand for business loans than ever. The catch, they said, is that there is also more competition than ever. That doesn't make much sense unless you realize that, while demand may have grown substantially, the demand from banks willing to address that demand has not. Banks are still chasing the same pool of borrowers with all the negative consequences that implies. For profitable growth, banks need to differentiate themselves and go where the competition is not.

That doesn't mean taking on more risk, it means having **the ability to lend to overlooked market sectors and business types** - ones which are good credits but may be difficult for other lenders to confidently take on as they don't have the data or analytics to make an informed decision.

The opportunity begins with the bank's own portfolio - **ON Portfolio Insights helps banks identify borrowers that may represent opportunities for growth within their current book**. For example, borrowers that have an immediate need for liquidity to reboot and rebuild, but that have businesses which have additional debt capacity and should be strong and profitable through the recovery. By providing these businesses with debt finance, a bank can no only help the business thrive but also achieve more growth itself. Because these are existing customers, the investment in time and effort of acquisition and onboarding has already been made, meaning this growth should be immediately profitable.

The ON Credit Intelligence Suite also provides sector insights to give a rich, data-driven picture of the factors driving revenues, costs and market size for each of the sub-sectors in the existing portfolio or for any given borrower. A bank can use this understanding to choose where to invest further, pursuing momentum in sectors where the macroeconomic tail winds are already building in their favor.

OakNorth also helps banks achieve growth in other ways. **For new loan origination**, **ON Credit Analysis provides automatic financial forecasts** (allowing intelligent covenant-setting) and peer analysis (giving a good sense of how a new opportunity stacks up against comparable businesses in the existing portfolio and in external data). As this and the credit report is all automatic, the operational efficiency can help the bank get in front of the prospective borrower with indicative terms and a bespoke facility before the competition. The additional insight given by forecasting can show where the bank can be flexible in structuring the finance to meet the needs of the borrower where competitors may be forced into a "one size fits all" race to the bottom on rates.

The ON Credit Intelligence Suite automatically updates forecasts as new financials are produced, and provides early warning signals when monitoring borrowers, so banks are alerted if a borrower is forecast to miss KPIs that were set or breach covenants. This allows the bank to stay proactive and deal with issues early so that growth remains profitable. The evolving "baseball card" view showing the current state of the borrower and their financials provides an ideal point of reference for a relationship manager. This means that before any meeting with the client, they are fully informed and able to act as a true financial partner. This in turn, will help the bank build a deeper, more consultative and ultimately more profitable relationship over time.

Finally, **ON Portfolio Insights helps credit officers keep their finger on the portfolio pulse and spot any areas that are starting to soften** before they truly become a genuine cause for concern. As it provides forward-looking stress tests that can be run on a regular basis, it can help a bank spot risks up to12 months earlier than they might otherwise be able to, allowing them to double down on areas of growth, while being able to take pre-emptive steps where things are not going so well.

CELENT

Solution Brief

OAKNORTH CREDIT INTELLIGENCE

Reinventing Credit Analysis and Monitoring with Machine Learning

Patricia Hines, CTP

May 3, 2021

CONTENTS

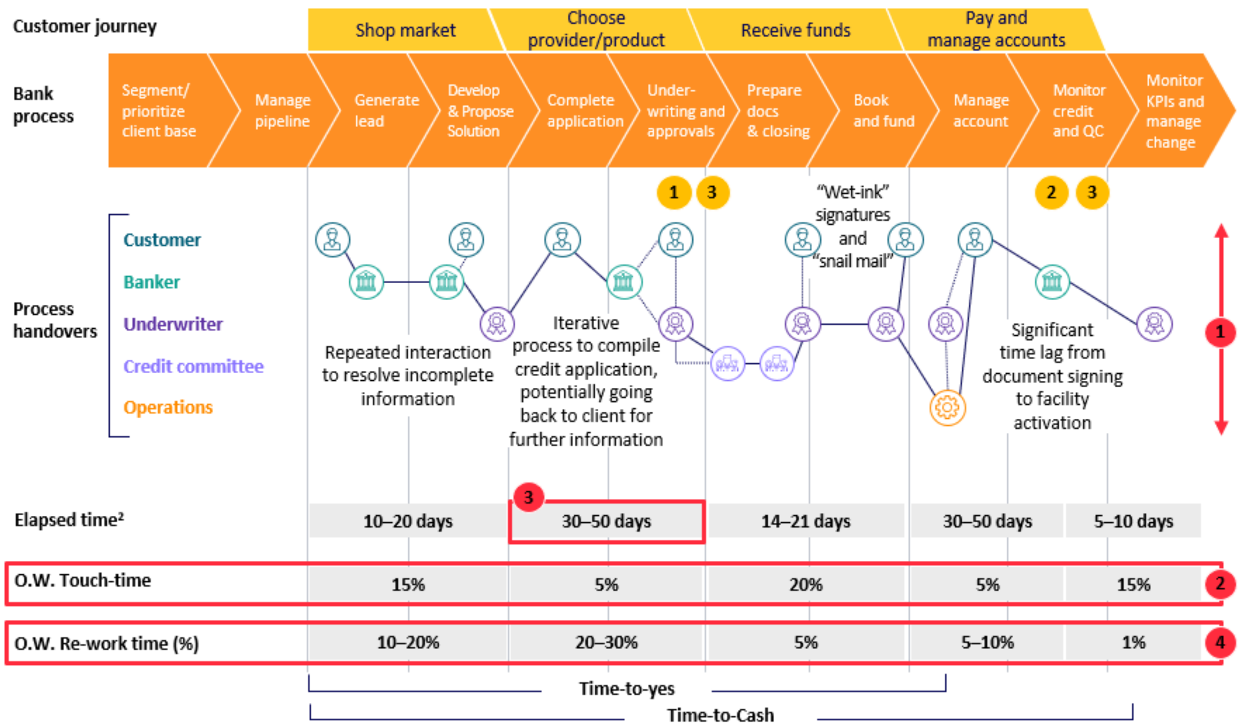
WHY IT MATTERS

Commercial loan origination has historically been complex and inefficient, requiring many disparate, disconnected steps to be completed, starting from initial discussions with the potential borrower and ending with booking the closed loan on the bank's loan servicing system. While automation and digitization tools have been available for a long time, investments in commercial loan technology are often postponed in favor of higher priority regulatory compliance projects or improving profit margins on high-volume small business credit products. The ON Credit Intelligence Suite seeks to help banks make better informed commercial credit decisions through portfolio insights, credit analysis, and loan monitoring.

When it comes to small business loans of $500,000 or less, big banks and platforms such as Kabbage, Ant Financial, and Lending Club offer several credit options, including small general-purpose business loans, asset financing, and invoice financing. To make higher-volume, smaller-dollar loans commercially viable, lenders typically base credit decisions on highly automated credit models that allow lenders to process loans quickly and efficiently. Instead of seeking to understand each business's unique needs and growth capacity, borrowers may end up with standardized and inflexible terms.

Banks can justify allocating significant amounts of time and resources to underwriting loans at the other end of the commercial lending spectrum (loans of $25-plus million) because the potential returns are substantial. These firms benefit from bespoke underwriting and deal terms. Typically, loans that fall between the lower and upper bounds, i.e., those between $500,000 and $25 million, are also traditionally underwritten, increasing costs and lowering the expected net profit margin. Figure 1 depicts the large number of handovers, extended waiting time for client information, extensive time spent in committees, many areas of rework, and other inefficiencies present in traditional commercial loan origination and monitoring.

Figure 1: End-to-end corporate lending process example[1]



1. European bank example; 2. Calendar days
Source: Oliver Wyman analysis

Key Process Pain Points

1 **Large number of handovers**
~15-20+ handovers for corporates

2 **Extended waiting time**
Up to **~90%** of total process time

3 **Significant time spent writing credit memos**
~75% of time-to-yes touch time spent memo writing[1]

4 **Significant time elapsed due to rework**
Up to 20% of each process step consumed with reworks

Several levers, both process and technology-driven, can be pulled to improve the effectiveness and efficiency of corporate lending (e.g., process redesign, client interface re-engineering, data rework, increasing straight through processing (STP).

Figure 1 also depicts some of the data and analytics pain points facing bank lenders.

Key Data and Analytics Pain Points

1 Overreliance on **backward-looking financial data**

2 **Lack of real time** performance data

3 **Lack of ability to differentiate** between sectors

Company and Solution Overview

Founded by entrepreneurs Rishi Khosla and Joel Perlman, OakNorth seeks to empower the Missing Middle: growth businesses that significantly impact economic and employment growth but still struggle to secure fast, flexible debt financing.

The idea for OakNorth began in 2005 when Rishi and Joel were looking for a working capital facility to support their growing business at the time, Copal Partners, a financial research firm they'd founded three years prior.

Despite being a profitable business with solid cash flow and retained clients, none of the commercial banks were willing to lend to them. The facility was too small to offset the bank’s costs for assessing and analyzing their financials and structuring a credit offering for their needs. A few months later, through one of their institutional client’s special situations desk, they managed to secure funding. So, an institutional division of a bank was able to support them, but the commercial lending part of the bank was not.

After scaling Copal Partners to a 3,000-employee business and selling it to Moody's Corporation in 2014, the partners set out to address the funding gap they had experienced firsthand and help growing businesses achieve their potential.

The ON Credit Intelligence Suite, Celent’s 2020 Model Bank winner for Lending as a Platform, was their solution to this challenge. OakNorth Bank in the UK, Celent’s 2017 Model Bank winner for Banking in the Cloud, was the first bank globally to deploy the technology. Launched in September 2015, the bank provides commercial loans of £500,000 up to tens of millions of pounds. The ON Credit Intelligence Suite has helped propel OakNorth Bank into the top 1% of commercial banks globally in terms of Return on Retained Earnings (RORE) and efficiency, enabling it to manage a multibillion-dollar commercial lending portfolio profitably.

The technology is now being deployed at a number of banks, primarily in the US, including PNC Bank, Capital One, Fifth Third Bank, Sumitomo Mitsui Banking Corporation (SMBC), Old National Bank, and Customers Bank.

KEY BRIEFING TAKEAWAYS

Built over five years by a team of 250 credit scientists and software engineers, the ON Credit Intelligence Suite is a data-driven, cloud-hosted technology that gives lenders a bottom-up, granular, forward-looking view at both the borrower and portfolio levels, based on rich and dynamic data sets and subsector-specific scenarios. It deploys automated, continuous analysis of multiple drivers across a borrower's business and peer group as well as the broader economy. This view provides an independent, consistent, detailed framework that offers deep contextual insight and enables rapid underwriting, immediate stress testing, and more agile and targeted strategic lending.

The ON Credit Intelligence Suite, designed to meet the needs of lending professionals, whether relationship managers, credit analysts, underwriters, portfolio managers, or credit executives, currently counts approximately $1 trillion in loans underwritten, analyzed, or monitored with the suite by its clients.

Positioning

OakNorth positions the ON Credit Intelligence Suite as enabling lenders to *Lend Smarter, Lend Faster*, and *Lend More*.

Lend Smarter
Lenders can manage their loan books more efficiently with data-driven credit intelligence that provides deep insight across the credit value chain.

Lend Faster
Lenders can make rapid credit decisions—up to 10 times faster than with traditional lending approaches—that help them win more business while minimizing defaults and delivering industry-leading customer delight.

Lend More
With more and better data, lenders can find the "right path to yes," expanding the range of businesses they lend to and uncovering new opportunities with existing clients. Furthermore, lenders gain better risk-reward—not because they are taking on more risk, but because they have a deeper understanding of the businesses worth lending to, driving growth across a broader and more profitable loan portfolio.

There are three central components to the ON Credit Intelligence Suite:

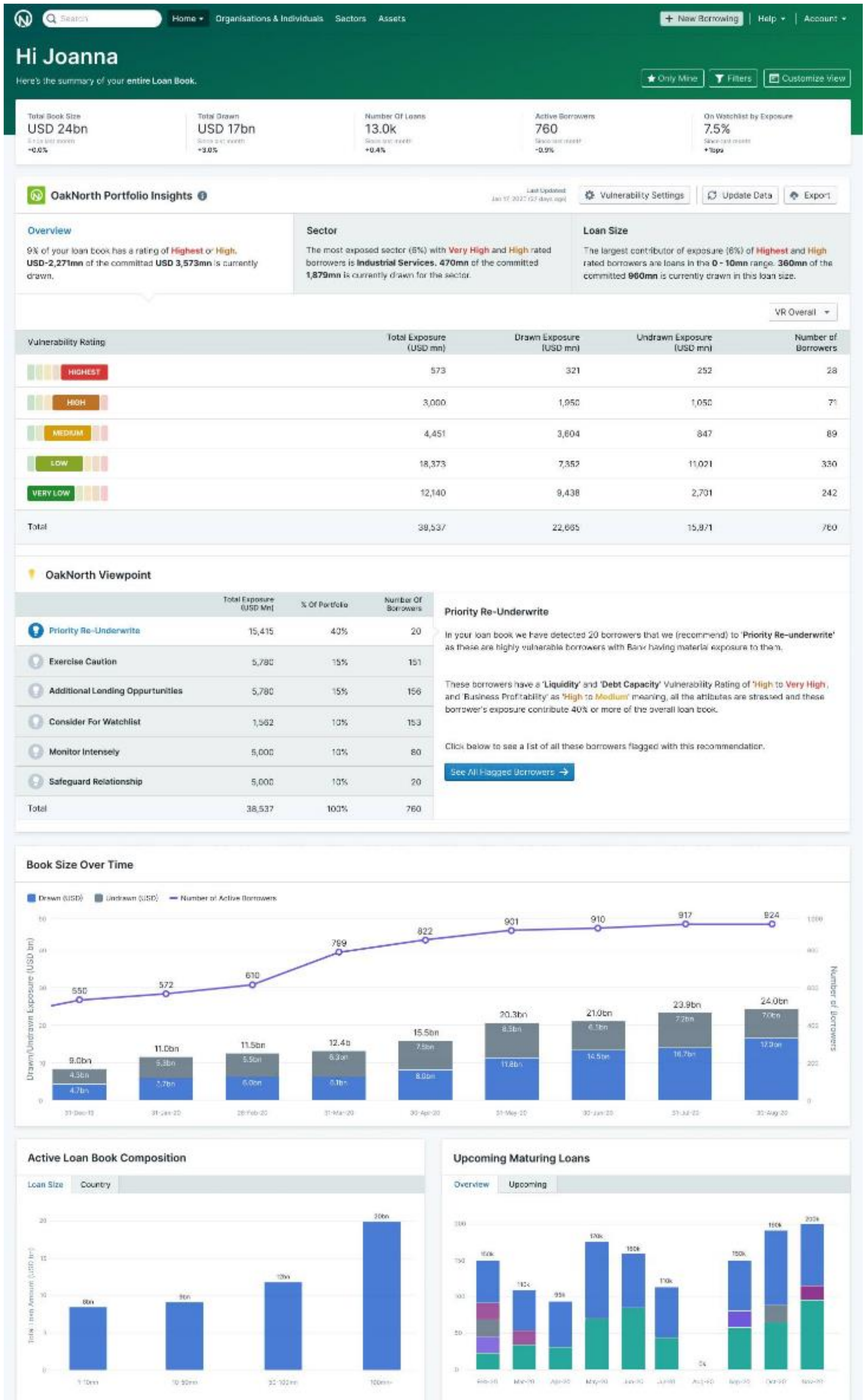
ON Portfolio Insights

The ON Portfolio Insights module instantly segments portfolios and rates loans based on the level of vulnerability. Using just 15 to 20 key data points from banks' spreading and core banking systems, ON Credit Intelligence produces over 200 proprietary, subsector-specific stress scenarios with regional overlays. These scenarios incorporate assumptions for impacts on key financial metrics such as revenue, operating costs, working capital, and capital expenditures.

Lenders can dynamically customize financial metrics to reflect the lender's credit risk criteria and appetite. The point-in-time analysis runs when a borrower's financials are first uploaded and will refresh whenever new financial information is provided, ensuring the bank always has the most up-to-date overview of its portfolio. This ability enables the bank to quickly determine the subsector-specific impact from events such as climate change or COVID-19, for example.

The tool can be run in 72 hours with a simple data export from existing systems, allowing an entire loan portfolio to be quickly stress-tested while flagging those individual obligors that require closer analysis.

Figure 2: ON Portfolio Insights



Source: OakNorth

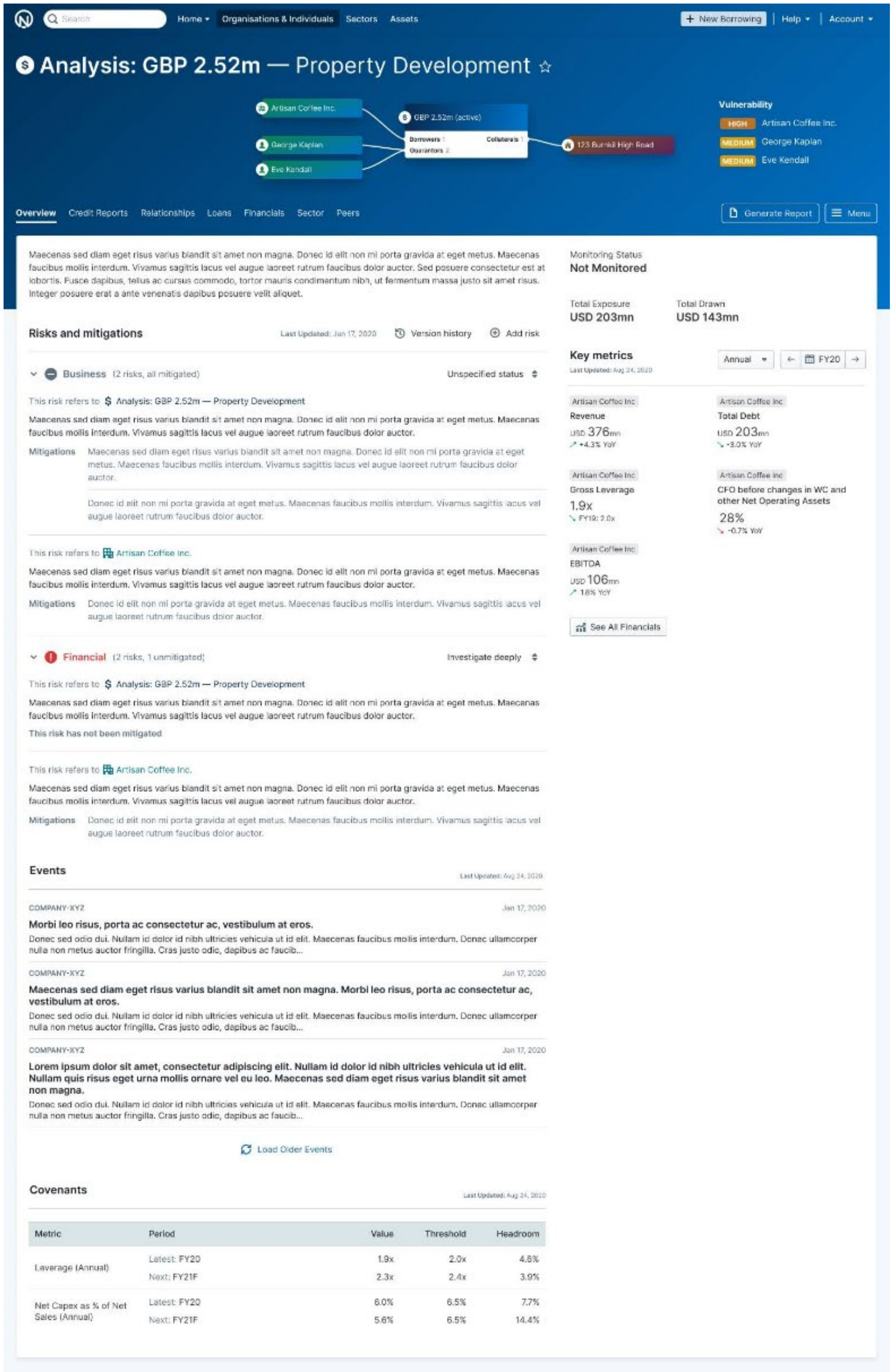
ON Credit Analysis

The ON Credit Analysis module provides a 360-degree view of the borrower with financial forecasting, sector insights, and peer analysis. The bespoke credit analysis performs obligor-level scenario testing at the origination point, balancing rich, objective data with subjective relationship manager insights.

The tool augments financial forecasts with graphical charts on sector and macro drivers to highlight the most important external factors affecting the borrower's financial performance. The tool also augments peer benchmarking across millions of relevant companies, comparing the borrower's financials against those of similar firms.

The module accepts obligor data and refreshes the analysis automatically as new data points become available. The automated analysis results in a data-driven, consistent, traceable justification for a "yes" or "no" credit decision, in addition to a relationship manager's assessment.

Figure 3: ON Credit Analysis



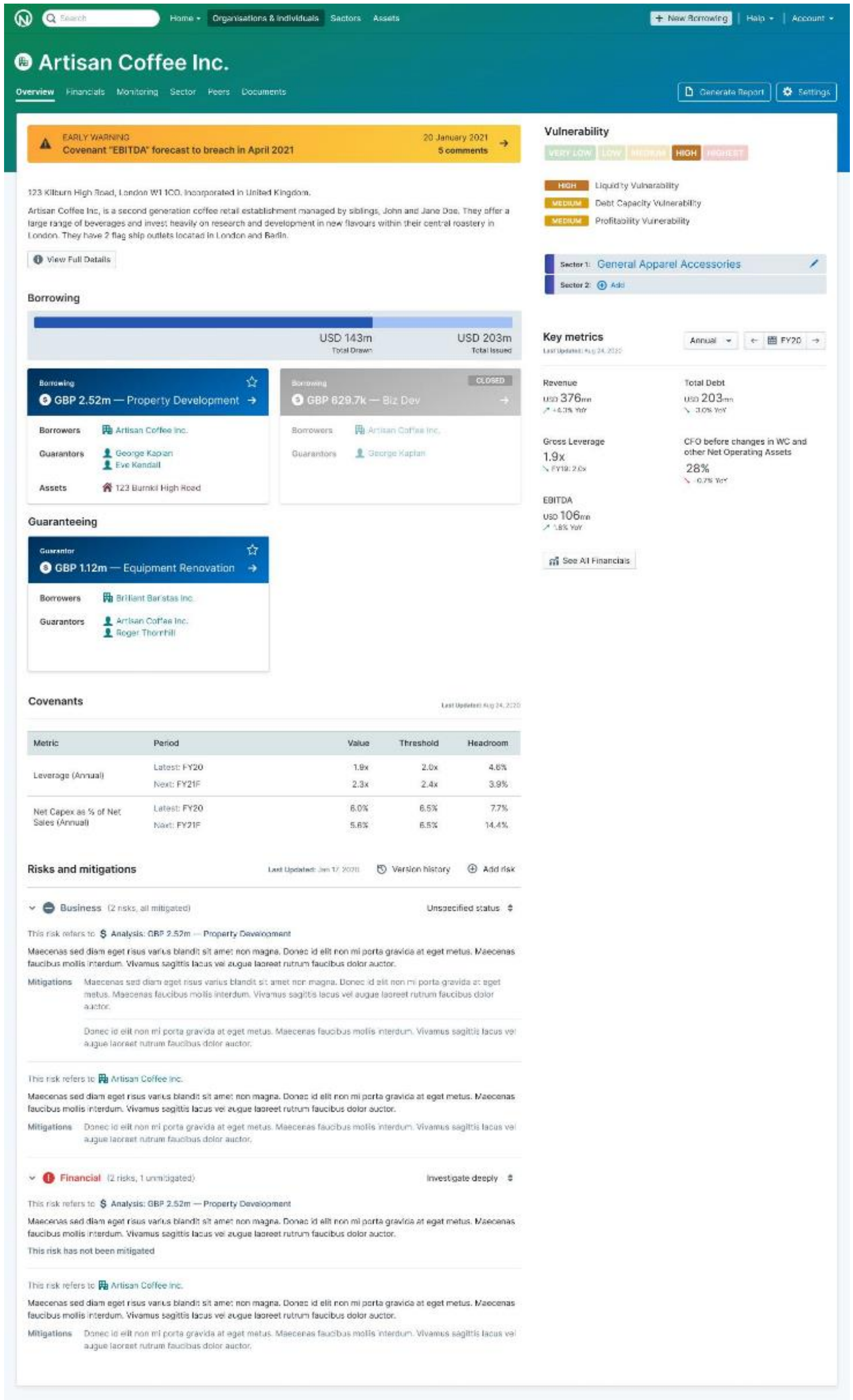
Source: OakNorth

ON Loan Monitoring

The ON Loan Monitoring module monitors billions of data points, allowing the bank to easily track industry trends and set early warning alerts as the software detects anomalies. This capability helps to protect against default in real time via proactive notifications on obligors, covenants, and other predictive signals underpinned by granular data drivers.

As updated financial data becomes available, the relationship manager or risk officer can perform near-continuous portfolio reviews and forward-looking scenario analysis. This capability provides relationship managers with the information they need to counsel customers and continue lending confidently.

Figure 4: ON Loan Monitoring



Source: OakNorth

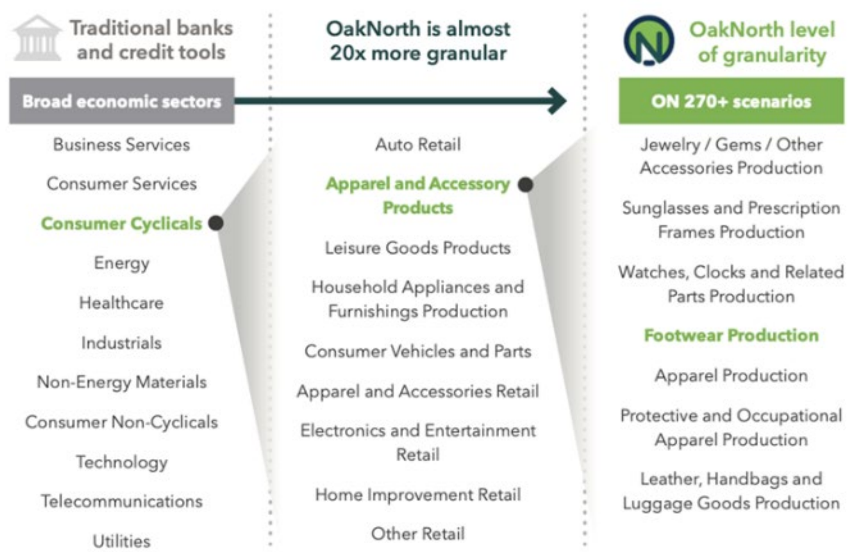
Underlying Technology

ON Credit Intelligence is driven by machine learning, including:

- OCR/NLP to ingest financial documents
- Detecting anomalies in financial statements
- Finding and ranking peers
- Driver selection to identify predictive factors of growth, revenue, and costs
- Monitoring portfolios for potential problems

The ON Credit Intelligence Suite categorizes borrowers into 1,600 granular subsectors and applies one of 262 domain-specific models to the business that is specific to a cluster of subsectors. For example, the Consumer Cyclicals sector breaks down into several subsectors, such as auto retail, home improvement retail, and apparel and accessory products. The ON software breaks out subsectors further into several "scenarios," as depicted in Figure 5.

Figure 5: ON Suite Sectors and Subsectors



Source: OakNorth

OakNorth points out that the financial drivers and outcomes of subsectors, within broader sectors, can vary significantly. For example, within the hotel sector, the dynamics of luxury hotels differs considerably from business-centric hotels. The scenarios framework is designed to assume that scenarios remain dynamic instead of static. OakNorth's models are also constantly updated with the most recently available data, including high-frequency third party data sets, to ensure that stress scenarios, like COVID-19, are providing institutions with the most accurate view of risk, at any point in time, across all subsectors in their loan portfolios.

Analytical frameworks, using AI and machine learning, allow the software to look for drivers of revenue or cost in each sector/subsector, cluster time series, and perform price prediction, sentiment analysis, geospatial analysis, peer comparison, and many other techniques, enabling a lender to very quickly understand a business and test how it will respond to different stress scenarios.

The ON Credit Intelligence Suite uses data science to create unique models that provide a granular level of analysis on each borrower. It looks specifically at the borrower's geography and their sector in that region to glean insights about the borrower's business. By combining borrower-provided data with the suite's vast repository of external data, lenders can add depth to point-in-time analysis and monitoring.

In addition to traditional external data sources, the ON Credit Intelligence Suite incorporates nontraditional data such as footfall data, online reviews, and social media posts to provide an even richer picture of the landscape in which the borrower is operating.

Implementation

As a cloud-based solution, the ON Credit Intelligence Suite works alongside banks' other lending systems and operations, enabling them to go live within 72 hours. A Proof of Value approach (or soft launch) is offered as an initial stage, followed by a broader enterprise-level engagement.

The ON Credit Intelligence Suite is web-based and fully cloud-hosted, and it can be integrated with existing systems that lenders may already have put in place or operate in a fully stand-alone configuration. OakNorth states that the suite gives relationship managers and credit professionals a granular, 360-degree view of the borrower based on historical data and a comprehensive, forward-looking view using automated, continuous analysis of multiple drivers across the business, its peer group, and the wider economy.

The ON Credit Intelligence Suite does not replace existing Probability of Default (PD) or Loss Given Default (LGD) risk rating models. It acts as an additional source of information that complements traditional historical, backward-looking models with view forecasted vulnerability scores. That said, OakNorth is undergoing a formal model validation exercise with an independent third party and should provide outcomes of those when complete. OakNorth mentioned that some clients have run their own model validations, comparing OakNorth outputs to internal risk ratings over time, and have seen positive results.

Regulatory Approach

When asked about engagement with regulators, OakNorth responded that it has , and will continue, to engage with regulators worldwide regarding the ON Credit Intelligence Suite and will continue to do so. It has met with senior regulators and their technical teams to explain its approach to credit intelligence, its detailed methodology, and the benefits that its software can bring to banks both individually and more holistically.

OakNorth states that conversations with regulators to date have been well received. The company says that it has taken the time to go through its glass-box approach in detail, demonstrating how it is able to provide full transparency and enable its clients to input their own stress test parameters as well as use OakNorth's scenarios. OakNorth continues to engage and work with regulators around the world and contribute to key discussions on regulatory policy in its fields of expertise.

OPPORTUNITIES FOR BANKS

Banks can undoubtedly leverage various AI tools and off-the-shelf AI-enabled credit scoring solutions to analyze internal commercial loan performance and borrower data purchased from business credit bureaus. OakNorth's unique approach to applying machine learning to traditional borrower-supplied financial statements augmented by numerous data sets, including unconventional and previously unavailable data, sets the solution apart from legacy credit analysis and portfolio monitoring tools.

OakNorth also benefits from using its sister company, OakNorth Bank, as a proof-of-concept testing ground for its software. During the pandemic, the bank approved over £1 billion in new loans to support UK businesses through the COVID-19 pandemic, including £385 million through the Coronavirus Business Interruption Loan Scheme (CBILS) and the Coronavirus Large Business Interruption Loan Scheme (CLBILS). During the pandemic, the bank experienced a dramatic increase in lending volume compared to the previous year and handled the surge with its ON software.

The ON Credit Intelligence Suite was tested during the COVID-19 pandemic. OakNorth developed its COVID Vulnerability Rating (CVR) framework, integrating 133 proprietary subsector-specific COVID-19 stress-test scenarios with regional overlays to create forward-looking credit loss forecasts. The CVR framework allows lenders to re-underwrite loans based on the projected impact of the pandemic, a granular approach that rated loans from 1 to 5 based on their vulnerability.

Banks like US-based PNC Financial Services used the CVR tool to identify at-risk loans and bring consistency to their credit approach during the crisis and closely monitor their overall loan portfolio. PNC deployed OakNorth across its commercial and industrial (C&I) and commercial real estate (CRE) loan books, mapping individual borrowers to 130 domains. In addition, PNC and OakNorth will run Portfolio Insights periodically to factor in rapidly evolving pandemic scenarios.

OakNorth also recently deployed its software at SMBC to drive process automation and portfolio monitoring efficiency in the US and Asia. SMBC also participated in a secondary purchase of OakNorth shares, making a $30 million investment in OakNorth Holdings Limited.

OakNorth claims that it can conduct an ON Portfolio Insights Proof of Value exercise in less than a week, which can allow a bank considering the suite to more quickly evaluate its business value alongside existing analysis tools. Although OakNorth states that ON Portfolio Insights only needs 14 data elements, additional integration and ingestion of borrower data from other bank systems and accounting software can strengthen credit analysis and portfolio monitoring.

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