Financial Risk Management Insights

CGI & Aalto University Collaboration

ABSTRACT

As worldwide economy is facing far-reaching impacts aggravated by the global COVID-19 pandemic, the financial industry faces challenges that exceeds anything we have seen before. Record unemployment and the likelihood of increasing loan defaults have put significant pressure on financial institutions to rethink their lending programs and practices. The good news is that financial sector has always adapted to new ways of working.

Amidst the pandemic crisis, CGI decided to collaborate with Aalto University in looking for ways to challenge conventional ideas and coming up with new, innovative approaches and solutions. During the summer of 2020, Digital Business Master Class (DBMC) students at Aalto University researched the applicability and benefits of new technologies to develop financial institutions' risk management.

The graduate-level students with mix of nationalities and areas of expertise examined the challenge from multiple perspectives and through business design methods in cooperation with CGI. The goal was to present concept level ideas and preliminary models on how to predict and manage financial risks more effectively and real-time. As a result, two DBMC student teams delivered reports outlining the opportunities of emerging technologies for financial institutions' risk assessments beyond traditional financial risk management.

CONTENTS

INTRODUCTION

The COVID-19 outbreak and its rapid diffusion across the globe have turned into the worst public health crisis in living memory. The combination of great uncertainty, fear of infection, individual restraints following public guidelines and mandatory lockdowns have played a key role in the sharp contraction of economic activity.

The harm for businesses and economies is becoming more apparent every day. In the second quarter of 2020, still marked by containment measures in most European countries, seasonally adjusted GDP decreased by 12.1% in the euro area and by 11.9% in the EU[1]. It has become obvious that the global economy faces a serious recession and a period of recovery that will vary by region and sector.

Meanwhile, economic models represent uncharted waters because the pandemic is unprecedented and, in every country, there is a lack of historical financial data to support model sanity checks. Accurate economic forecasting is going to be more "art" than "science" for now.

CGI is working with financial institutions worldwide to deliver business recommendations and technology solutions, especially in the area of lending, to address the immediate crisis and minimize the financial impacts of COVID-19 - both now and into the future[2].

As a part of this effort, CGI decided to collaborate with Aalto University to create insights on how to combat the pandemic and challenge conventional ideas with new ways of doing things. During the summer of 2020, students of Digital Business Master Class (DBMC) at Aalto University researched what new methodologies and technologies financial institutions could use to manage COVID-19 related risks in their businesses. The DBMC comprised of graduate-level students with mix of nationalities and areas of expertise. Master, MBA, EMBA and PhD candidate students with business, IT, engineering and Arts backgrounds were working in the project. The students examined the applicability and benefits of new technologies that could uncover innovative ways for predicting and managing financial risks more effectively and real-time.

As a result, two Aalto DBMC student teams delivered reports combining concept level ideas and preliminary models outlining the opportunities of emerging technologies for financial institutions' risk assessment beyond traditional financial risk management.

[1]Eurostat – News Release 121/2020
https://ec.europa.eu/eurostat/documents/2995521/11156775/2-31072020-BP-EN.pdf/cbe7522c-ebfa-ef08-be60-b1c9d1bd385b
[2]Andy Schmidt – CGI Vice-President, Retail Banking (2020)
https://www.cgi.com/en/blog/cgi3r/adapting-lending-time-crisis-alleviate-customer-hardship-and-bank-pressures

BACKGROUND

The level of uncertainty is a characteristic feature of the post COVID-19 world that along with the level of complexity (multiple key decision factors), ambiguity (too many unknowns) and volatility (rapid and unexpected changes) make risk measurement challenging. Thus, the conditions the crisis triggered have specific implications for credit risk management of financial institutions.

Among numerous challenges, financial institutions are facing the likelihood that loan defaults will significantly increase. Banks are having more difficulties with managing credit risks due to following reasons. First, because of the global lockdown, more individuals and businesses are unable to repay their loans and the lure of government incentives increase the risks of fraudulent loan applications. Second, globally the current banking system is still slow, partly manual, and based on physical distribution networks, but made even slower with the disruption to normal business operations. Third, the fear of increased loan defaults and fraud makes lenders more hesitant to issue new loans. This negative cycle of fears, result in lost business opportunities and productivity on a global scale.

However, changes in creditworthiness differ by sector more than previously seen. Specific industries, such as food retailers do better while others, such as tourism and hospitality are in a full shock. Moreover, the traditional sources of data normally used in credit risk assessments became out-dated unexpectedly. The crisis introduced itself as a ruthless blow at the end of a largely favourable global credit cycle. The data from previous months, on which lenders previously relied, was no longer fruitful in evaluating the resilience of borrowers.

Many financial institutions are now reviewing their business models and renewing their outdated credit risk management tools and processes. It has become evident that there is an increased need for disruptive digital solutions that can predict loan defaults and measure creditworthiness more accurately than before. Traditional methods and even innovative fintech solutions from pre-crisis times are no longer accurate or agile enough for the new normal. Hence, it is no surprise that financial institutions are now observing for innovative approaches to acquire and utilize data with real-time monitoring of credit risks.

Moreover, the current situation has put pressure to scrutiny the conventional customer journey of corporate banking clients and the process of loan origination, which can be excessively slow in the times of crisis.

Two multidisciplinary Aalto DMBC student teams designed concepts, taking into consideration current risk management practices and the use of emerging technologies. The goal is to present in concept level new ideas and preliminary models how financial institutions can predict and manage risks more effectively and in real-time. Focus was on corporate lending, big companies and considering global aspect.

Concept for corporate lending

MARKET RESEARCH

Corporate customer banking journey

Starting point for the Aalto DBMC team 1 was to investigate the current customer journey of corporate banking clients in lending. The customer journey divides into five stages with each stage having different aspects to consider, see figure 1.
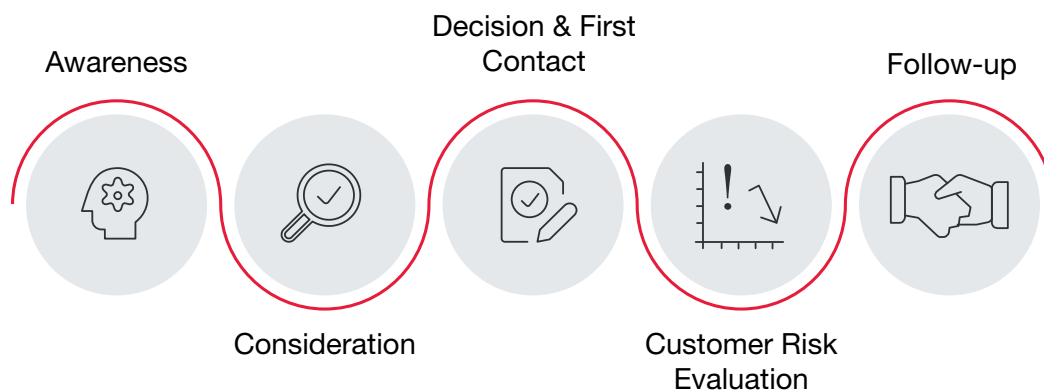

Figure 1 – Corporate Customer Banking Journey in Lending (created by Aalto DBMC students)

The students found that the customer journey for corporate banking clients is potentially outdated considering available solutions and market conventions in other services. A process, which includes document gathering with cumbersome, manual processes and relies on meetings, calls, and emails alone to interact with customers. Currently, there are many digital technologies, which can be used to make the customer journey faster, easier and flexible.

The most important activity from bank's perspective is to recognize the basic risk level of a company in the "Decision and First Contact" phase. In the fourth "Customer Risk Evaluation" phase, it is also crucial to get easily exact and profound information about the company and the market including financial aspects but also social media information, stock market information etc. data sources could be easily used.

From client's perspective, it is likewise essential that a company could give the needed information easily and fast so that the bank could perform risk analysis as fast as possible. Whereas, in the "Follow Up" phase, it is central to receive information of the company's or the market's changed circumstances. As COVID-19 has shown, this phase is very critical & the data ingested should be in real-time as situation develops day by day.

Rating agency approach

The students' concept suggests that rating agencies' opinion on corporate credit ratings based on objective and consolidated criteria could function as a methodological backbone for the suggested solution. Standard & Poor's approach[3] (figure 2), for example, takes into account all the following factors:

---

[3]Corporate Methodology - S&P Global Ratings (2013)
https://www.spratings.com/scenario-builder-portlet/pdfs/CorporateMethodology.pdf

- Evaluation of companies' risk profile

  > Business Risk Profile: takes into consideration the risk and return potential for a company considering the market within it participates, the country risks related with the market, such as economics, institutional, legal and financial, and the competitive position of the company within the market it operates.

  > Financial Risk Profile: takes into consideration the way a balance sheet and funding is constructed. Cash flow and leverage are then used to determine the financial risk profile.

- Determination of the anchor

  > Business Risk Profile and Financial Risk Profile are combined to determine the anchor.

- The anchor can be modified by several additional rating factors

  > Diversification/portfolio effect

  > Capital structure

  > Financial policy

  > Liquidity

  > Management and governance.

- Industry specific criteria is added to the previous criteria

- Corporate rating is determined
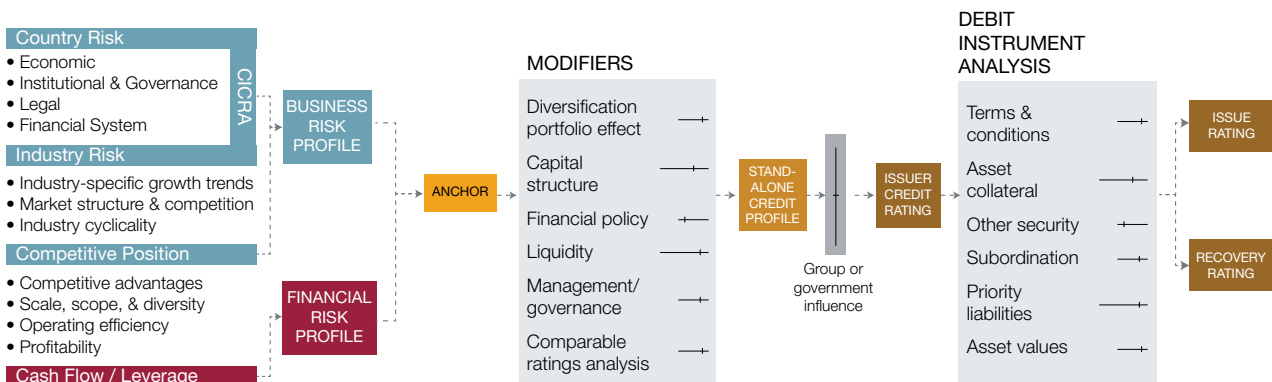
CORPORATE CRITERIA FRAMEWORK

Figure 2 – Corporate criteria framework (Corporate Methodology - S&P Global Ratings)

Credit risk solutions on the market

The students also conducted market research, which shows that there is a wide range of credit risk profiling solutions available. Shortlisted solutions include judi.ai, Provenir, Harvesting and underwrite.ai and the following analysis will outline the individual strengths and weaknesses of the solutions. Furthermore, a conclusion on missing key features will outline the gap emerged from the new COVID-19 business needs. It turned out that even these solutions of mainly fintech-origin do not generally include social media, stock market or other available data into analysis.

	Traditional	Artificial Intelligence	Real-Time	Stock Market	Social Media	Other
JUDI.AI	✓	✓	✓	✗	✗	✗
PROVENIR	✓	✓	✗	✗	✗	✓
Harvesting	✓	✓	✗	✗	✗	✓
underwrite.ai	✓	✓	✗	✗	✗	✗

Table 1. Short listed market research (created by Aalto DBMC students)

JUDI.AI

According to the feature analysis, JUDI.AI presents the most promising solution (pre-COVID-19). The Canadian-based fintech solution supports automated underwriting and its key features include:

- **Cash flow mapping:** Visualization of cash flow variations over a 12-month period.

- **Operating costs:** Visualization of operating costs over a 12-month period.

- **Existing obligations:** Map out any existing loans or line of credit commitments. See how many loans, how much & lending period length.

- **Categorization engine:** Machine-learning model categorizes financial statements in seconds. Draws from vast data sets to analyse financial transactions and assigns a category to them.

Provenir

Provenir is specialized in risk analytics and has a powerful risk decision and data science platform, which can be integrated with any data service. Its key features include a low code data science approach that supports the ease of use for business users. As a result, credit risk profiling is possible with increased flexibility and agility. Provenir is also following a multicloud deployment strategy, making it easy to implement on multiple cloud environments including AWS and Azure.

Harvesting

Harvesting is an agriculture intelligence engine with a mission to drive financial inclusion for farmers globally. The AgriFin company leverages their expertise in remote sensing satellites, agriculture, artificial intelligence and financial inclusion to help drive financial inclusion by providing actionable data to financial institutions. They utilize remote sensing data alongside with a range of traditional and alternative data points to assess farmers' creditworthiness. Continuous monitoring of farmlands, capturing changes in vegetation/crop cover and providing an early warning system for repayment risk.

Underwrite.ai

Underwrite.ai applies advances in AI derived from genomics and particle physics to provide lenders with nonlinear, dynamic models of credit risk, which outperforms traditional approaches.

- **Genetic algorithm** to determine the best modelling techniques for specific data, industry, and risk perspective.

- **Machine learning** ensembles to create a set of statistical models that can be applied to applications.

- **Big data** – Its cloud-based system is able to process terabytes of portfolio data and return a decision in real-time.

- **REST API** - The solution is easy to integrate via an API service. Nothing to install and no capital expense.

Although, the solutions presented above use varying degrees of artificial intelligence to predict credit risks, they all fall short on the same features. Data sources are not real-time. They largely rely on data sources that can be outdated and do not represent a reality snapshot. Given the unprecedented pace at which COVID-19 has catapulted the world into a new digital era, the expiration date on financial data is no longer accurate for credit risk analysis. There are key indicators from other data sources that can provide real-time or predictive data but not leveraged by the current fintech solutions.

CONCEPT FOR CREDIT RISK PREDICTION

The students' concept centres on a credit risk prediction, which aims to solve the COVID-19 related challenges. The solution would automate traditional credit risk rating methodology and allow banks to make more accurate decisions and credit risk assessments based on instant changes. The solution would feed credit risk rating methodology with real-time data sources, using machine learning and deep learning models to fasten the analytics process, see figure 3. It would also involve cloud platform to allocate dynamic computing and storage resources. Traditional credit risk rating agencies like Moody's and S&P have introduced similar corporate rating methodologies and addressed the essential rating criteria and steps to assess credit risks. These criteria can be seen as the risk indicators or features from a data science perspective. The measures could be reproduced automatically by digital transformation and by applying machine learning or deep learning methods.
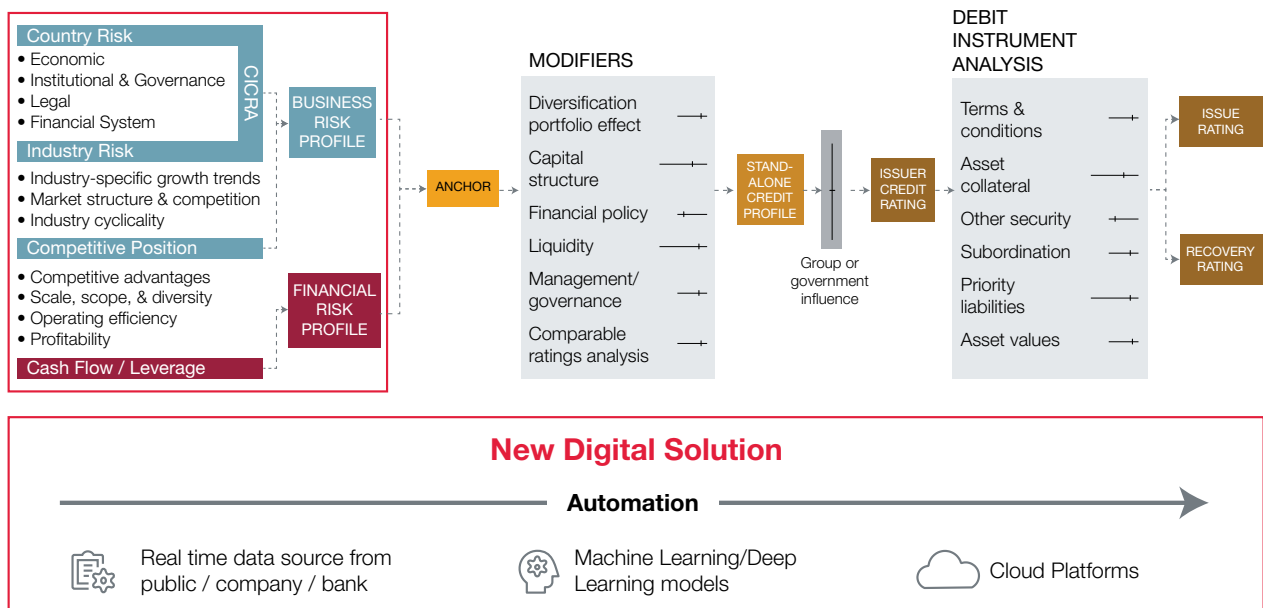

Figure 3. Solution adaptions (created by Aalto DBMC students)

Further, figure 4 shows how the solution is intended to be built on cloud platforms, Google Cloud Platform as an example. Students combined cloud scheduler (Google Cloud), which triggers cloud functions to run every defined period (e.g., 1 hour or 1 day) to fetch the data sources and store them in cloud storage for further pre-processing by dataproc. Then, the solution uses BigQuery for large dataset's analytics and to identify the risk indicators which to feed into the next model training stage using the AI platform. Finally, the model would be deployed as a service with additional prediction and visualization tools to support decision-making.
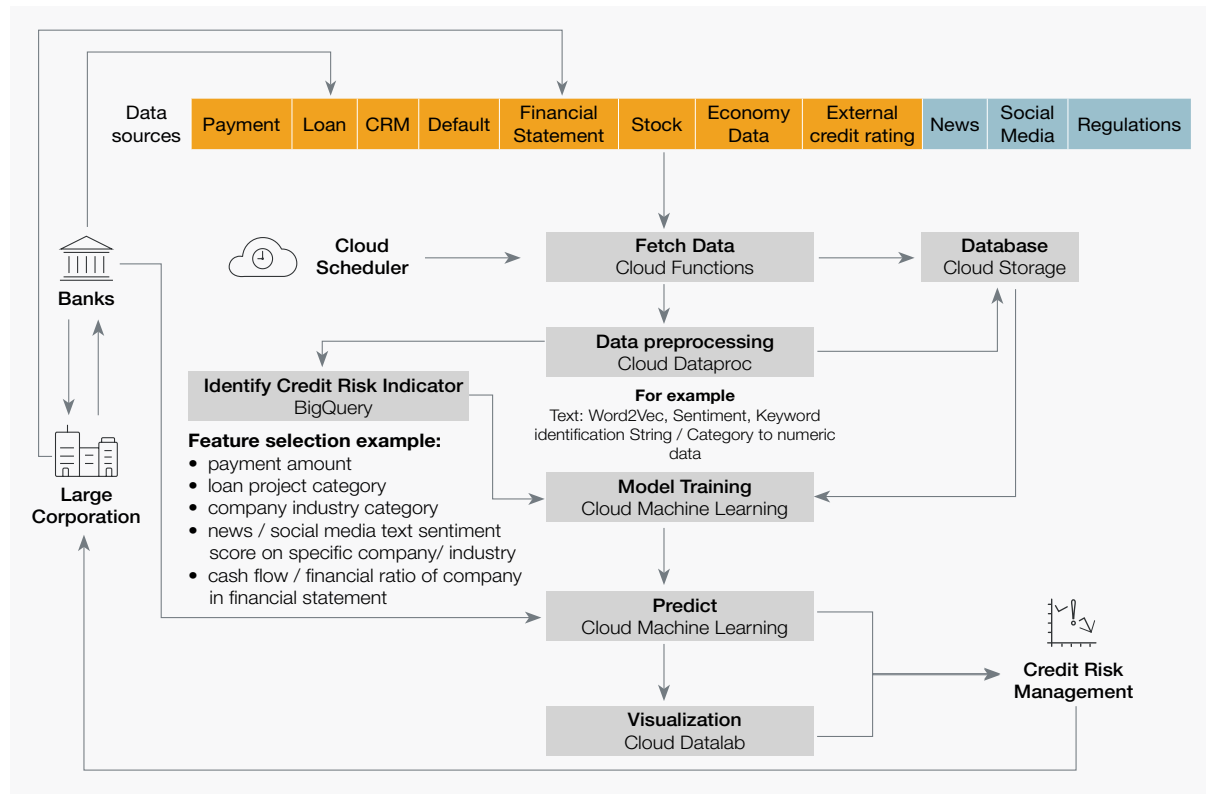
Figure 4. Solution architecture (created by Aalto DBMC students)

Real-time data sources

The proposed concept includes new real-time data sources from three data areas: public, corporate, and bank. The students investigated the availability of data, pre-processing methods of each data type, the value of the processed data, and how data is fed to the model as risk indicators, as summarized in the table 2.

After pre-processing all the data, the aggregated risk indicators provide useful information in understanding country risk, industry risk, the competitive position of a company, and the cash flow that directly affects a company's payback ability. Students' model could now capture country risks such as macroeconomic trends, governance, and regulatory changes or industry risks, such as

industry-specific trends (take tourism and airlines during COVID19 as an example). These could be estimated not only by the traditional financial numbers but also from the news and social media. The competitive position of a company could take real-time stock prices into account, in addition to the quarterly published financial statements. Further, payment data of a company could be used to predict cash flows. This is possible at least in Europe if the company gives consent to use the payment data.

The students plan that the solution is able to handle the vast amounts of data through cloud platforms and discover the value of data through data science.

Data source	Sources from	Credit Risk Indicator
Social Media	Public APIs provided by Twitter, FB, Instagram, LinkedIn, Youtube.	Use natural language processing (NLP) such as Word2Vec which builds the relationship between key words and default, for example financial keywords, regulation keywords, company / industry / country mention, and the sentiment analysis. Thus, by recognizing these keywords and the sentiment of a new post, the model is able to predict the trend of the macro economy, specific industry, or company, and update credit risk assessment.
News & Press	Trusted global and country specific news source, for example Kauppalehti, Talouselämä, HS in Finland. News data can be obtained by implementing web crawler, public APIs (e.g. https://newsapi.org/s/google news-api), or buying from commercial APIs.	
Regulations	Web crawling from official government websites, or government open databases.	
Stock Market	Trading Platforms (e.g. Free Stock Charts, Trading View, Meta4, etc.) and public/commercial APIs (e.g. https://iexcloud.io/).	By analyzing stock prices, the model understands the relative strength of countries, industries and companies under certain circumstances.
Financial Statement	Public financial statement/ Commercial APIs (https://financialmodelingrep.com/developer/docs/).	Financial ratio indicates the both business and financial performance of a company. Cash flow is also a direct indicator of the company's debt paying ability.
External Credit Risk Rating	Rating agencies (Moodys, Standard & Poors, Fitch).	Overall credit, issue and recovery ratings of a corporate from external credit rating agency are still important references to predict credit risk.
CRM	CRM data exists in banks but currently it may be in a separate system from which automated integration is required.	The qualitative analysis such as interviews, manual ratings, notes of the customer relationship helps to understand the customer history.
Payment data	Banks are allowed to share information under client agreements. Also open banking and open data is a new trend in financial technology that encourages financial transparency.	Personal payment data could be an indicator for demand of certain goods/products, while corporate payment data can predict the cash flow of a company.
Loans		Details on loan like project type, and the industries in which the project is involved can be a good indicator for project specific credit risk.
Defaults	Banks, legal system, tax authorities.	Companies' default history (timing and amount) shows their past behavior and is a good credit risk indicator for certain industries. On the other hand, default history can be used as the output label for AI models.

Table 2. Data source analysis (created by Aalto DBMC students)

Finally, students created an overview (see figure 5) how the data sources of the solution could be utilized.
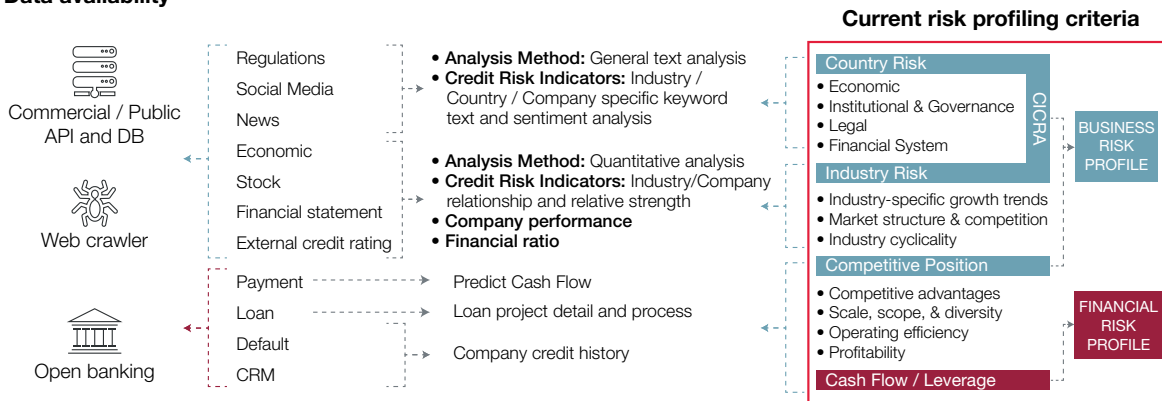
Data availability

Figure 5. Utilization overview of the data sources (created by Aalto DBMC students)

Digital loan project follow-up system

After loan initiation, the concept includes a digital loan project follow up system that establishes a closer relationship and encourages transparency between a bank and the borrowing company. By doing so, the solution can have more accurate and real-time input from the company itself and the project implementation process to feed to the model as modifiers to re-examined credit risk. Important factors are, for example, the diversification of the business line, capital structure, financial policy that may affect a company's financial risk profile, the monetary flows, and any new changes to the management

and governance of a company that may shape a different company competence. The project implementation process is also a direct factor in evaluating the credit risk based on the implementation schedule and any new challenges such as COVID-19 may slow down or stop the loan process. Besides the follow-up system, students also suggested inviting financial experts to automate the scenario analysis and debt instrument analysis. Finally, the solution provides a credit rating covering all credit characteristics in aggregate, see figure 5.
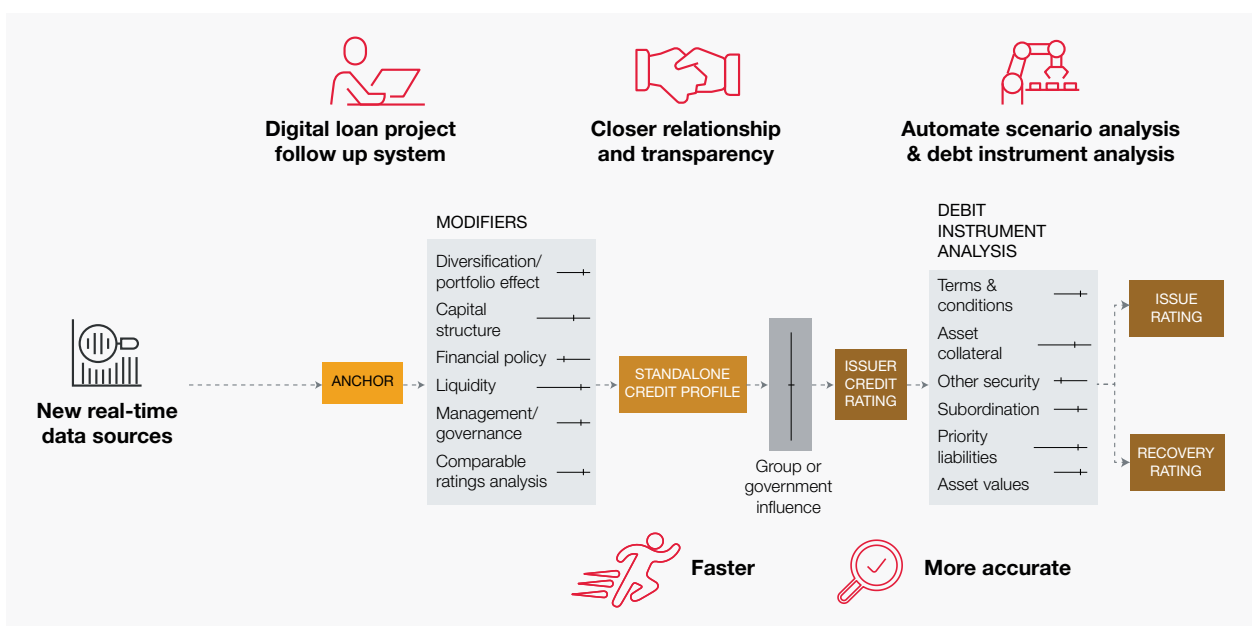

Figure 6. Digital loan project follow-up system (created by Aalto DBMC students)

Refined customer journey

The students envision that the currently widely used corporate lending customer journey could be enhanced as proposed in figure 6. This involves faster reaction to emerging customer challenges during the "Loan initiation phase" (Phase 1). Since, the AI-based credit risk assessment tool is updated with real-time data sources that allows a bank to get an instant prediction on a company's credit rating based on the current situation whenever a large corporation initiates a loan project. In the "Loan implementation phase" (Phase 2), the digital loan project follow-up system feeds latest information about the project implementation and any follow-up data the company is willing to provide into the model. This provides updates of credit risk assessment that helps both the bank and the company to co-operate and to adapt to new changes and manage credit risks.
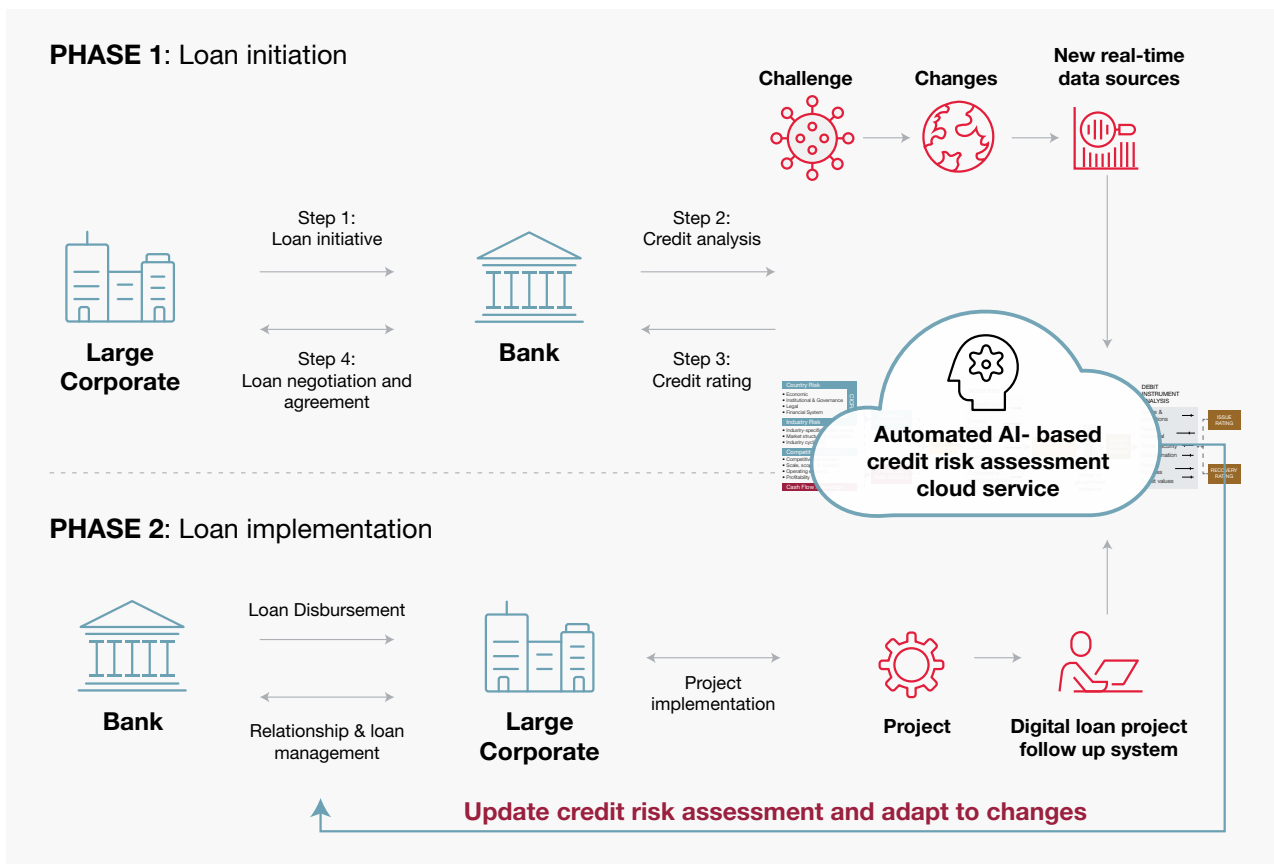

Figure 7. Digital loan project follow-up system (created by Aalto DBMC students)

Concept for loan origination

TRADITIONAL LOAN ORIGINATION MECHANISMS

Loan origination process workflow

Aalto DMBC student team 2 started their work with examining the conventional loan origination process. They found that the process of credit risk management stands for complex well-established indicators, procedures and frameworks for a comprehensive risk analysis, measurement and monitoring various risks in relation to the borrower and the relevant industry. Credit risk management relates closely to a 6-stage loan origination process workflow with multiple sub-stages, which can take up to 45 days, see figure 8 below.
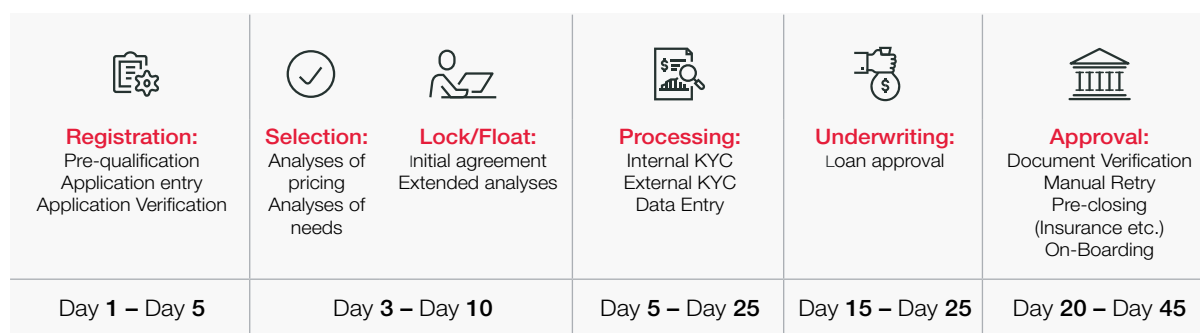

Registration: Pre-qualification Application entry Application Verification	**Selection:** Analyses of pricing Analyses of needs	**Lock/Float:** Initial agreement Extended analyses	**Processing:** Internal KYC External KYC Data Entry	**Underwriting:** Loan approval	**Approval:** Document Verification Manual Retry Pre-closing (Insurance etc.) On-Boarding
Day **1** – Day **5**	Day **3** – Day **10**		Day **5** – Day **25**	Day **15** – Day **25**	Day **20** – Day **45**

Figure 8. Standard loan origination process workflow (created by Aalto DBMC students)

The students argue that the current process is missing flexibility, the use of cutting-edge technology and digital process innovations. Latest trends in loan origination strongly refer to digital origination models and methods, while existing financial market conditions support and show a mutual need for lenders and borrowers to reduce formalities, paper documentation based decisions and human interaction. Therefore, the students' idea was to transform the standard loan origination process, as presented in figure 9 below.
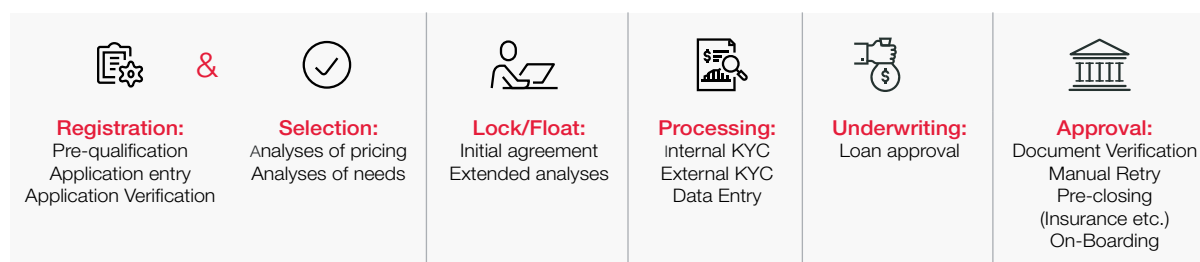

Registration: Pre-qualification Application entry Application Verification	**Selection:** Analyses of pricing Analyses of needs	**Lock/Float:** Initial agreement Extended analyses	**Processing:** Internal KYC External KYC Data Entry	**Underwriting:** Loan approval	**Approval:** Document Verification Manual Retry Pre-closing (Insurance etc.) On-Boarding

Figure 9. Transformed Loan Origination Process Workflow (created by Aalto DBMC students)

The transformed loan origination process workflow, illustrates the possibilities to combine and speed up the Registration and Selection activities by shifting to a fully digital customer interface and by using self-service functionalities for loan application procedures as well as by increasing automated underwriting and documentation management in the Lock / Float phase.

Shortcomings of the current solutions

The students state that current credit risk management solutions are based on static-state models, long-term planning and lack flexibility, cutting-edge technologies as well as digital process innovations.

Even though, financial institutions have been developing internal credit analyses, modelling and scoring systems, which allow for accurate risk modelling at high resolution, studies have shown that majority of these models are static. The models and techniques base usually on logic to use a static, single or multi-factors to model credit risk patterns for decision support tools for underwriters or as automated decision algorithms for a range of customers. However, the current models are lacking of grounding by theoretical framework, real-time situation responsiveness and are inefficient in the face of economic crisis, political fluctuations or global pandemic like COVID-19. In COVID-19 unexpected challenges deem to become standard phenomena in corporate lending and risk analysis processes. Common so called "security position" practice in

credit risk models for corporate customers focus on the historical data, e.g. balance sheets, of the applicant and deprioritizing analyses of future risk factors and modelling of repayment capability. Financial institutions seem to put an emphasis on creating a long-lasting customer relationship model with borrowers, which have a collateral (or other asset backing) whereas momentous corporate borrowers are often excluded.

By reflecting all the above listed challenges, the students suggest that there is a need for a technological solution with multi-factor and dynamic credit risk modelling framework as well as a need for mind-set change in corporate lending.

PROPOSED LOAN ORIGINATION CONCEPT

There is no stand-alone model for credit risk analysis and modelling that fulfils the needs of financial institutions in the post-COVID-19 environment. The combination of new statistical models and emerging technologies can lead to a stronger analytical framework and to a more reliable credit risk management. Therefore, on an aggregate loan portfolio level, additional tools are required to capture the dynamics of environment, interaction of the multiple macro and bank specific factors and the nature of corporate loan origination. Risk measurement with the proposed solution makes it possible for the lender to quantify faster and in a real time the "worst-case" scenario, both on a single loan and on a portfolio level. The solution, being a flexible combination of emerging technologies, could be used in traditional corporate lending process in several ways.

Such as in conjunction with traditional credit risk assessment tools by helping to identify the issuers that have a high, moderate, or low probability of having a ratings downgrade below the minimum accepted rating in earlier stages of loan origination, within the issuers that meet the minimum rating requirements. Or as a separate automated toolkit in pre-underwriting stage, which provides the possibility to analyze and combine different data sets and sources like market implied credit ratings, default probabilities and financial ratios.

The application of the cloud-based solution acts as a more effective and robust loan decision-making process, which can accelerate the automation and combination of steps in the Selection phase. Furthermore, using cloud-based data approach can significantly contribute into creating a more holistic and coherent approach to legacy data and risk management systems as well as speed up transition to omnichannel banking in general as the same data is available for use in all distribution channels simultaneously.

Applied technologies

Concept level solution proposed by the student team consist of number of new technologies such as API integration, artificial intelligence, machine learning and document intelligence.

API integration

An application program interface (API) is a way to create connectivity between data and a user's needs. The students suggest that the data exchange supports the financial institution and ultimately the underwriter as it eliminates or diminishes the need for human interaction for obtaining data sources. The solution APIs would efficiently and effectively secure and validate the data for use when considering lending principles. Integration to different APIs would happen via developer portals. While, public data is largely available at no cost, most APIs carry usage fees.

API integration from more comprehensive data sources could be used by incorporating data sources from both an international and a local level. Using larger number of data sources will give a financial institution more holistic view of a firm when deciding lending practices. For instance, the solution could include data from OECD, IMF, World Bank, other central statics agencies, central banks, and other authorities.

Moreover, personalised benchmarks for each business type in individual loan analysis can be applied. What this entails is a comprehensive overview of a loan application considering, for example, the products, services, and company size. The result is a personalized loan that specifically meets the needs of the loan applicant. For a financial institution, this will decrease the risk of default as it develops a sounder application that envelopes more data from the applicant. Ultimately, the goal is to be able to consider additional factors that would traditionally not be analysed.

Once an API integration has been completed, the transfer of data requires little to no human interaction and the data can be verified to be correct and authentic. Furthermore, the solution's APIs would incorporate alternative data sources to garner meaningful insights. For instance, a firm's payment of transportation fees, social media, invoice payment behaviour, and tax payment behaviour can be applied in analysis. With the inclusion of the additional data APIs will provide powerful enrichment of data for credit risk management purposes.

Students also propose that the solution would exploit text analytics in monitoring trends on firms', CEOs or world leaders' twitter feeds, since tweets have been seen as an indicator of the stock market.

Additionally, due to COVID-19, many firms' financial health has been damaged and therefore it is imperative to make prognosis, which is based on accurate and up-to date data to ensure lending practices are safe. Data where pre-COVID-19 financial behaviour is eliminated or controlled should be used in loan application process.

Artificial intelligence and machine learning

The proposed concept would utilise functional artificial intelligence (AI) technology to provide fast and accurate risk assessments, using both financial and non-financial data to understand the behaviour and capacity of the applicant. AI makes it possible for machines to learn from data, adjust to new inputs, and perform human-like tasks. The solution would analyse large amounts of data with powerful algorithms that find patterns and drive real-time decisions.

A loan decision and loan contract terms are generally tied to the creditworthiness of the business that is applying for a loan. The more data you have about a borrower (and how similar firms have paid back debts in the past), the better you can assess their creditworthiness. The amount of loan, interest rate, and repayment timeline are thus associated with assessments of the value of the collateral (equipment, assets, etc.), the likely level of future inflation, and predictions about overall economic growth. The promise of AI is that theoretically an algorithm can learn the decision-making logic of a loan process and replicate it, whilst continuing to learn to make better decisions.

As financial institutions aim to issue the least amount of loans, which result in a failure to repay, efforts to limit risk are crucial. By combining predictive models with machine learning (ML) financial institutions can better assess the creditworthiness of new loans or credit card applicants, leading to fewer "bad loans" issued. Machine learning focuses on developing computer programs that autonomously learn and improve from experience without being explicitly programmed. The three broad types of ML are:

- supervised learning,
- unsupervised learning, and
- reinforcement learning.

Common tasks performed by ML algorithms include regression, classification, forming networks, and discriminant analysis (clustering) – all of which are useful applications to credit risk management. Additionally, ML algorithms can be used to analyse unstructured data, with applications that include text analysis. This creates further opportunities in credit risk management, such as modelling early warning signals based on media reports.

Document intelligence

The proposed concept utilises document intelligence technology to read and understand applications and documents with high accuracy for more efficient application management and decision-making.

Document intelligence has the goal to glean important insights from a wide-ranging business documents. Such documents include loan applications, invoices, purchase orders, employment agreements, vendor contracts, mortgage terms and financial statements. However, document processing is often done at least partly manually with human intensive effort. The cost, error inconsistent and time consumed, make document intelligence a solution that conquers these shortcomings by automating document review and processing with AI and related technologies.

The document intelligence feature is characterized by basic cloud-based solution integration between AI, RPA, OCR (optical character recognition), and supervised ML. Untangling the tools, the tactical use of OCR is to understand and read business documents. The use of RPA helps to interact with systems, enabling banks to conduct through credit analysis in hours rather than in days. Supervised ML and AI can reproduce important parts of what trained credit teams do nowadays, for instance, interpreting and reading financial statements.

The combination of these tools offers multiple benefits such as; storable and researchable data, high accuracy of thresholds, stress testing, multiple uses of results and data, and has the benefits of straight through processing. Moreover, in the COVID-19 crisis, the need to understand impact of new circumstances and run lending rules on limited historic cases of defaults is higher. In this context, document intelligence based client model could detect and capture the risk aspects in an insightful way compared to traditional methods. For future reference, Natural Processing Language is one of the steps that can be added to the proposed concept.

Concept benefits

Advanced credit risk management solutions incorporated with cutting-edge technologies present evident advantages for their users. By utilizing emerging technologies and the ever-increasing wealth of data available, modern solutions are able to equip risk management teams for better decision-making and assessment of credit risks. Systems furnished with AI and ML capabilities, and boosted with RPA can handle vast amounts of available data and catch outliers that signal about amplified levels of credit risk. Technology can speed up the traditionally manual process flows. ML algorithms are able to browse for non-financial information, such as social media feeds for warnings. The ML-based systems can also learn from experience and develop itself to better detect trends or specified indicators. Real-time data sources enable lenders to act proactively to changes in borrowers' financial positions & minimize risks, while alternative data can function as a fuel for augmented risk modelling. Whereas, running the system in cloud environment allows for elastic computing, scalable data storage & tailored deployment models that match the user's needs.

All the above-mentioned can result to organization benefits, such as earlier recognition of expected credit losses, reduced default risks, enhanced capital ratio as well as to lower overhead costs through automation.

It is worth noting that customer experience is likely to improve due to clearer & faster lending process.

CONCLUSION

The Aalto DMBC students work provides insights, novel ideas and high-level concepts for financial institutions tech-scouting mission in having superior credit risk assessment tools during and after these unprecedented times. The research findings indicate that credit risk predictions must be more agile and responsive to changing times.

In an environment of rising delinquency and credit losses, organizations need rapidly deployable solutions that accelerate reduction of bad debt while minimizing operational costs and risks. On the other hand, credit risk mismanagement can be very costly to a lender and expose it to excessively risky loans and loan losses if credit risk assessment is based on outdated methods and inaccurate data.

CGI has extensive capabilities in applying new technologies in financial risk management and thorough understanding of legacy system challenges in banking. Addressing COVID-19 discontinuity in risk models is of high importance for the banking industry.

CGI

About CGI

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. Operating in hundreds of locations across the globe, CGI delivers an end-to-end portfolio of capabilities, from strategic IT and business consulting to systems integration, managed IT and business process services and intellectual property solutions. CGI works with clients through a local relationship model complemented by a global delivery network to help clients achieve their goals, including becoming customer-centric digital enterprises.

Learn more at cgi.com.