Corporate Risk Analysis using Alternative Data Sources

March, 2023

Agenda

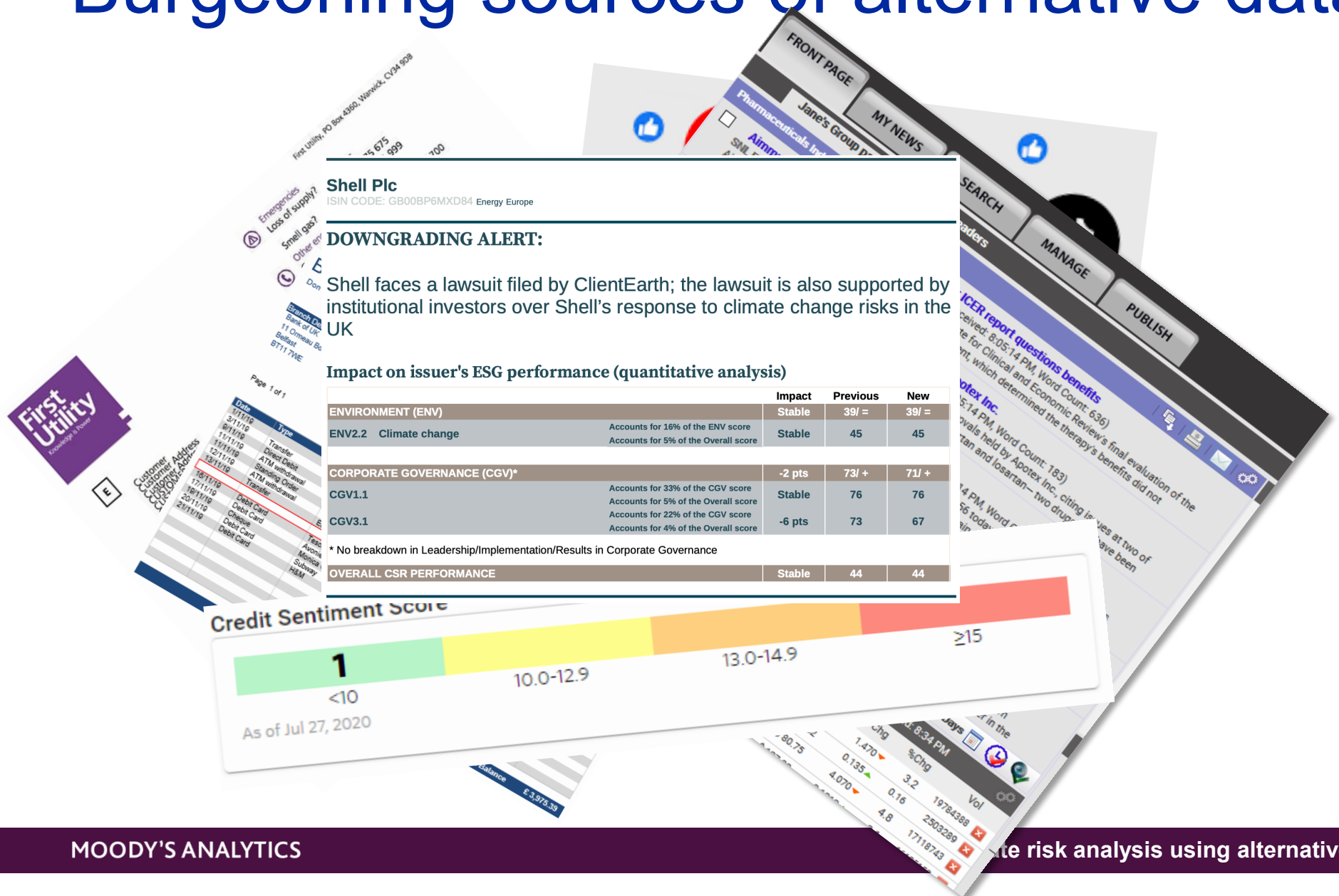
Presentation

1. Expanding Sources of Alternative Data
2. Extracting Credit Signals from Alternative Data
   - News and Social Media
   - Behavioural Analysis
   - Location Analysis
   - ESG and Climate Risk Indicators
   - Macroeconomic Indicators
3. Using Signals for Better Decision-Making and Monitoring
4. Panel discussion

1

Expanding Sources of Alternative Data

Burgeoning sources of alternative data



However, the main questions are:

- Which of them are credit risk sensitive?
- Do they add information to traditional analysis
- What is the cost-benefit?

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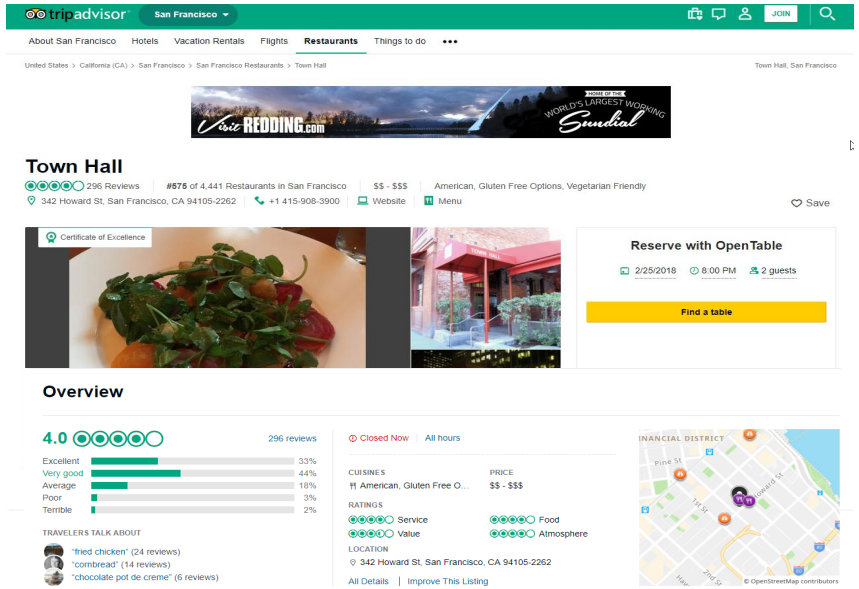
Extracting Signals from Alternative Data – Some Examples

News and social media



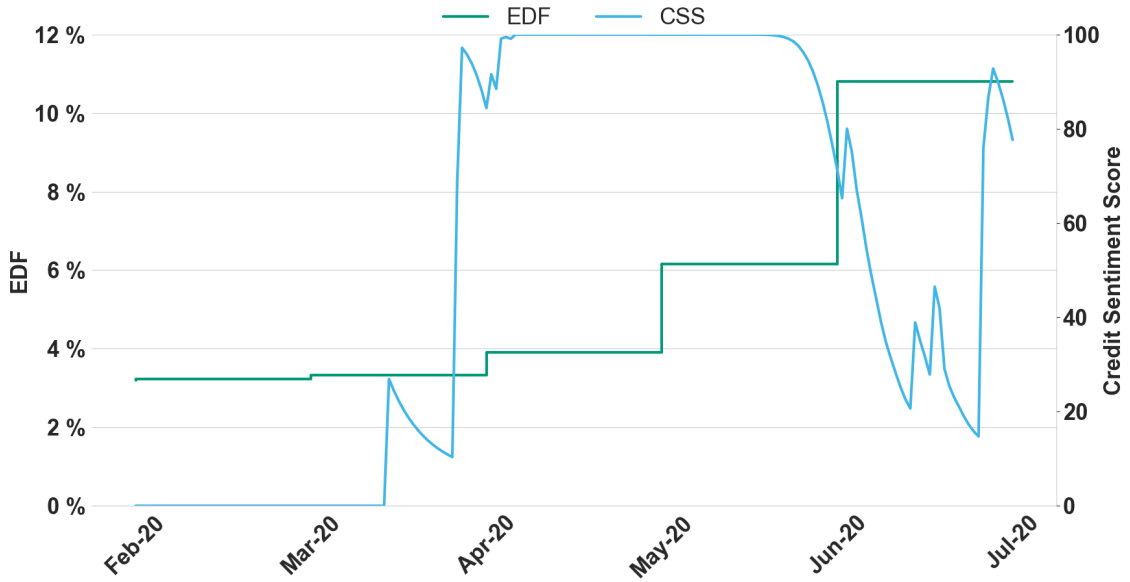
- Review news articles, social media, booking sites, etc. for useful information about a company from a perspective of external or internal stakeholders.
- From a lender's perspective who wants to learn/monitor public perception about a business, social media presentation is not concise/directly helpful.
- Automated NLP and Machine Learning Models scan news and social media sites and translate into actionable information.

Neiman Marcus files for Chapter 11 Bankruptcy in May 2020

- News is available out with company reporting schedule
- Credit Sentiment Score more reactive than typical PDs / Ratings

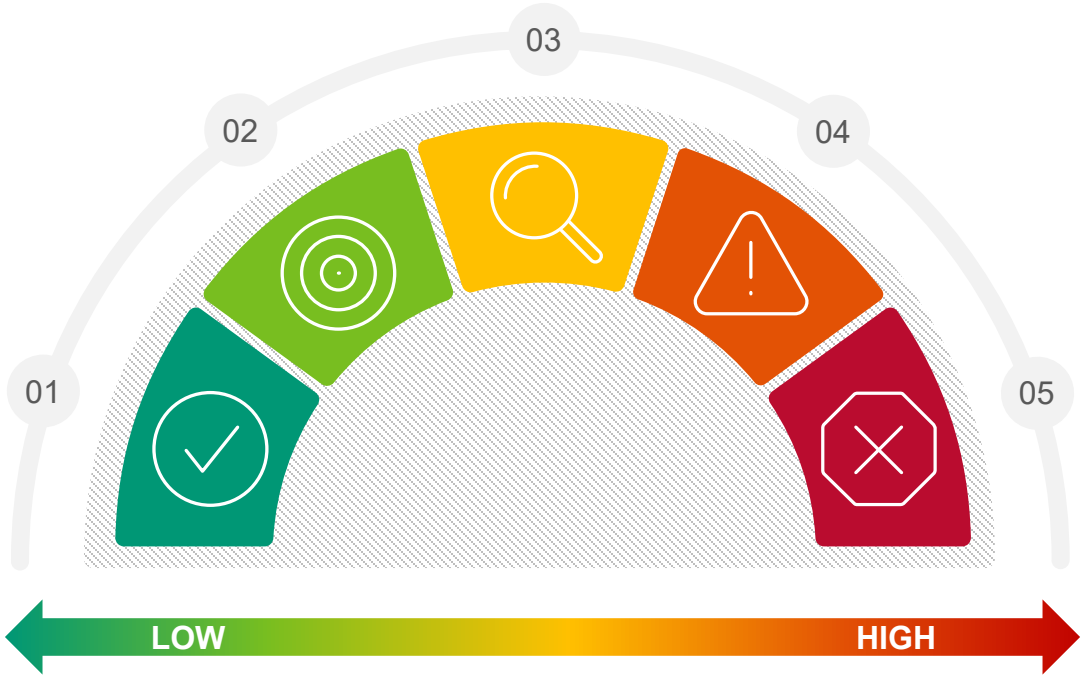
Negative news is often the only news

- Not all companies appear in the news
- Some only appear when there are issues
- Tracking credit negative news will pick these up



Credit Sentiment Scores

Interpreting company scores



LEVEL 01 — **Zero**

No bad news found

Suggested Action: None

LEVEL 02 — **Less than 10**

Not enough bad news to be a concern, unless there has been a move away from a historic average

Suggested Action: Periodically review any bad news highlighted

LEVEL 03 — **Between 10 and 13**

Enough bad news for risk to be elevated

Suggested Action: Review all bad news found to asses materiality

LEVEL 04 — **Between 13 and 15**

Enough bad news indicating higher risk

Suggested Action: Review materiality of news and reassess risk

LEVEL 05 — **Above 15**

Enough bad news to be a major concern

Suggested Action: Review materiality of news and reassess risk using all information available

Note: Cut-offs chosen by considering tail percentiles of population of active public companies.

Behavior Analytics Further Enhance C&I Credit Scores

Financials available in Dec 2021 ≈ Financials available in Dec 2022

The main chef asked for a sharp increase in the salary. The owner had to let go the main chef in Jan 2023

Date	Rating
2023-1-21	2
2023-1-19	1
2022-12-5	4
2022-11-1	5

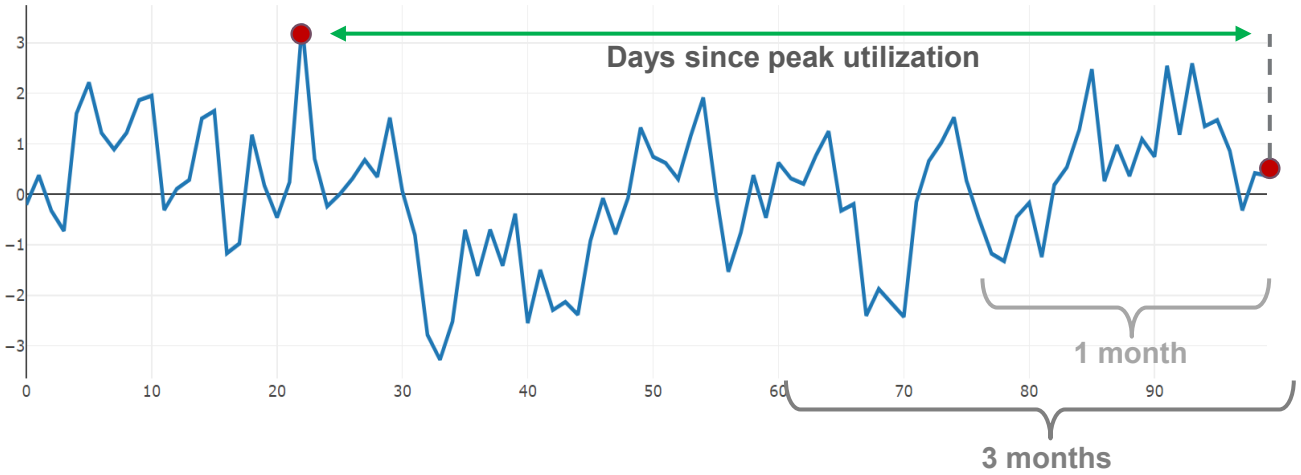
Defaulted in Mar 2023

Constructing the Behavioral Profile

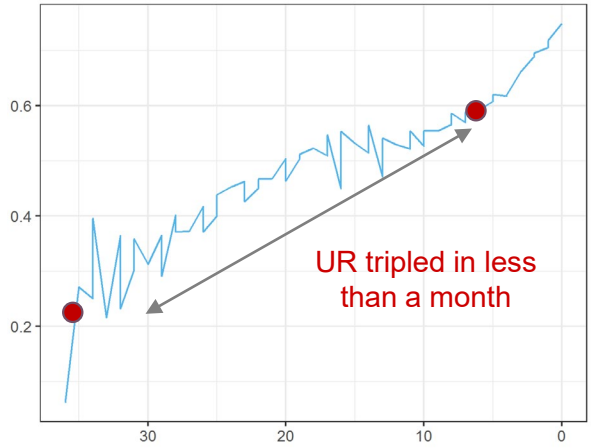
Delinquency	Collateral / Covenants	Utilization and transaction data	External Rating / Reputation	Industry performance
Past delinquency	Updated LTV	Loan lifecycle	Updated internal rating	TTC-to-PiT PD conversion
Bureau score	Collateral quality and capital gains	Utilization rate dynamics	Rating from Credit Bureau	Pro-forma analysis
Amount in arrears for past delinquency	Collateral projection based on industry indexes	Unusual patterns in transaction data	Updated external agency rating	Credit cycle adjustment and macro factors
Overdue fees and penalties	Ownership structure	Dynamics of trade receivables	Updated bureau score	Benchmarking with other companies in the sector
Delays in settling other loans	Covenants	Turnover volatility	Litigation, fraud and court cases	Industry outlook

Examples of Utilization Factors

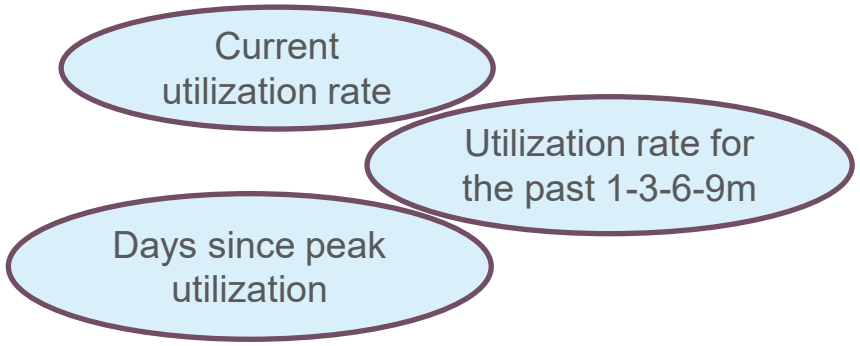
Performing account



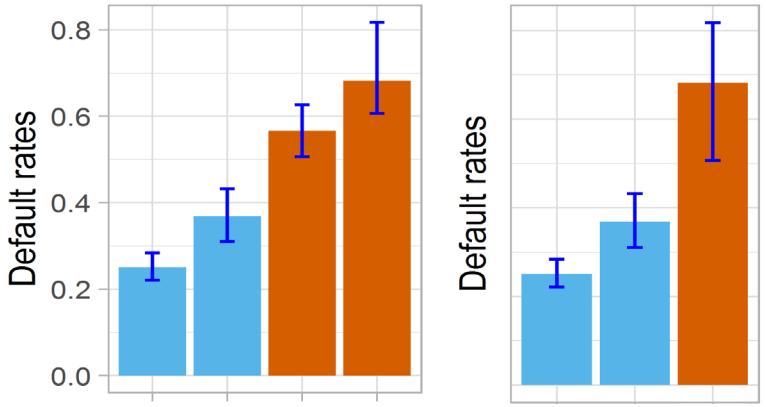
Account before default



Examples of factors:



Example of binning

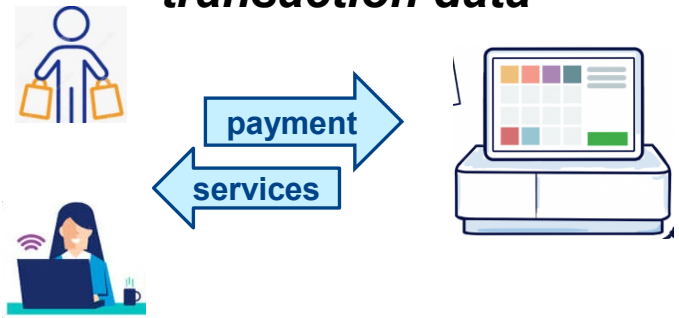


Corporate Liquidity Profiling: Visualization

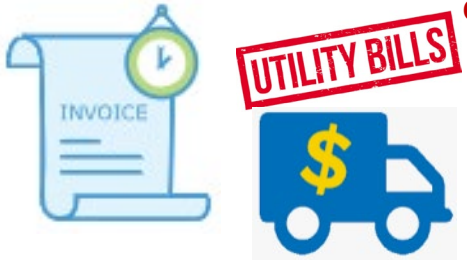
Use transaction data to profile corporate entities

POS and transaction data

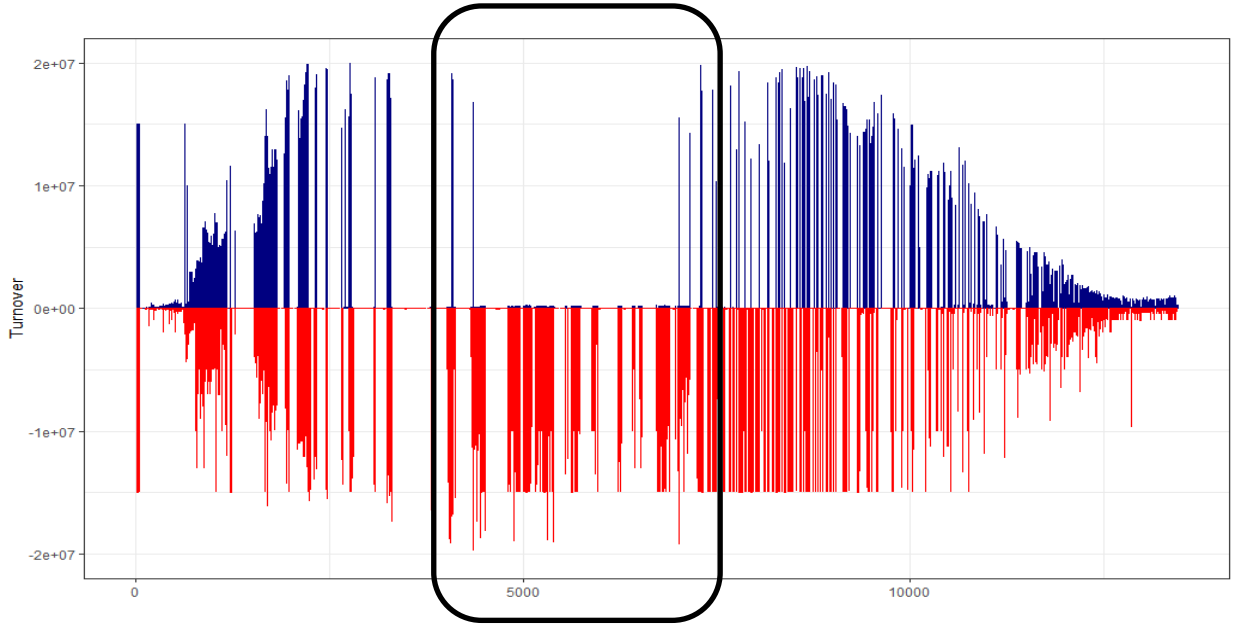
Forward-looking cashflow data



Forward-looking expense data



Liquidity gap

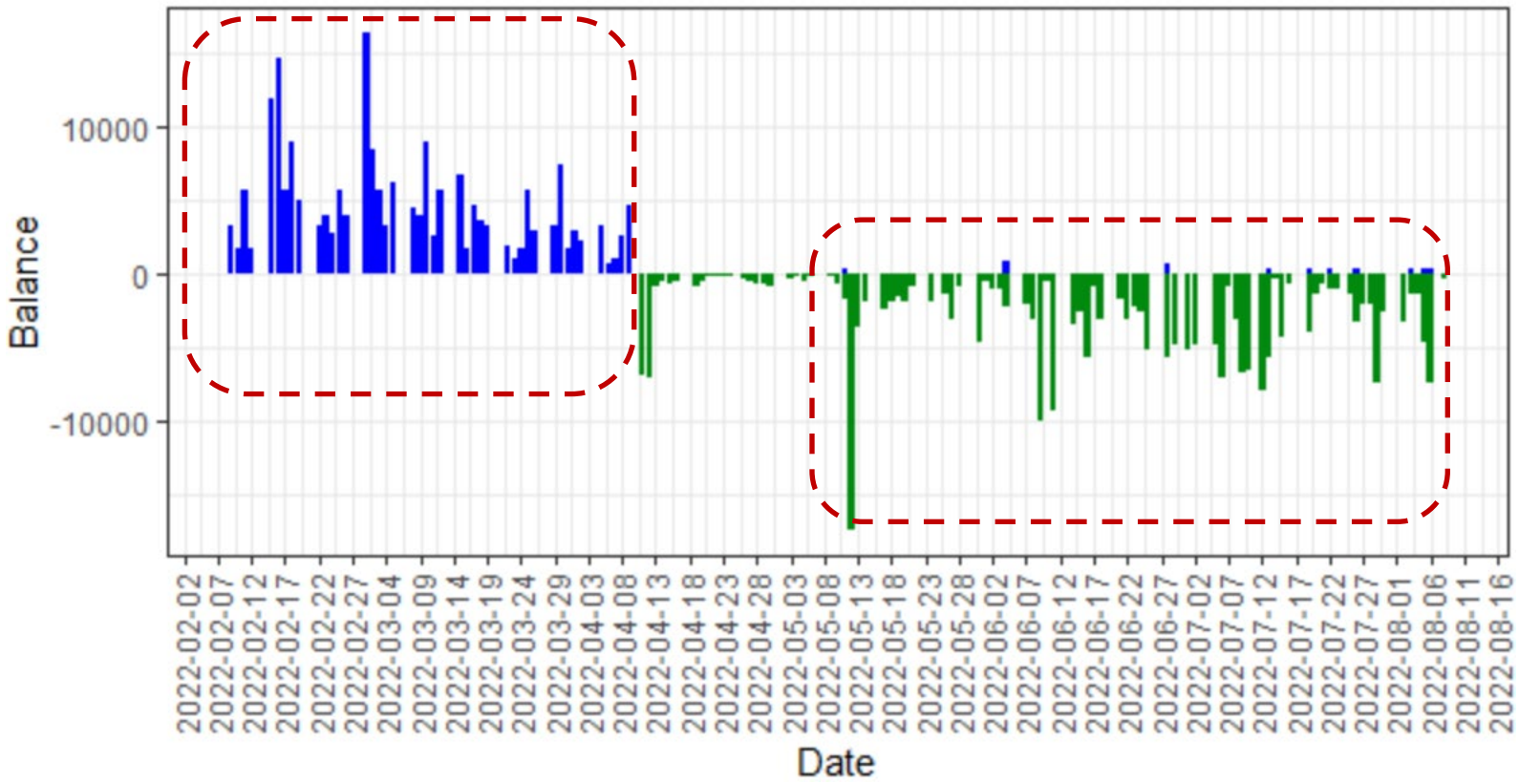


Key insights:

- Liquidity profiling help identify funding needs and they a forward-looking indicator or delinquency.
- For SMEs, the liquidity analysis helps recognize the ability to scale business, grow and identify the size of customer base.
- For corporates: liquidity analysis helps to update and now-cast financial statements and updated credit score.

Another Example…

Cashflow / bank statement analysis



COMMENTARY

Significant cash deposits have reduced (blue bars) and the account relies on overdraft / working capital funding (green bars).

This signals two hypotheses:

1. These corporate entities have started significant investment.
2. The entities are in dire need of additional liquidity.

Corporate Transactional Data

Data sources and analytics for corporate liquidity profiling

Revenue-related sources

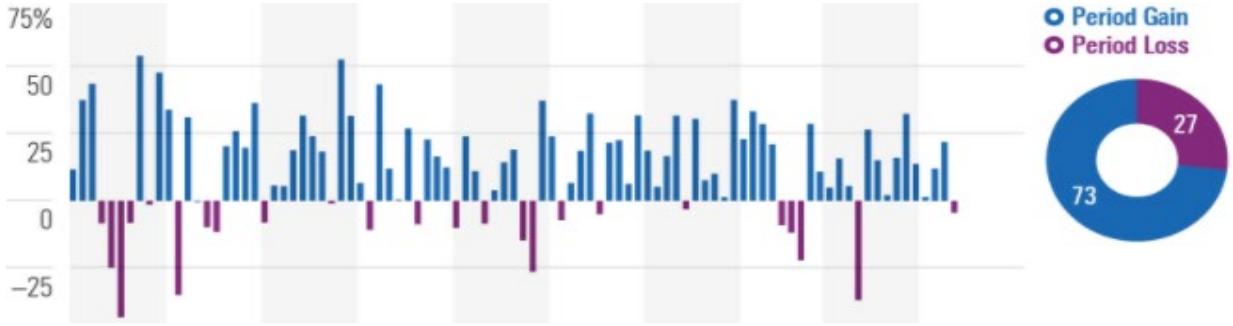
A. POS data
B. Account transaction data
C. Logistics data
D. Supply-chain payment data
E. Invoice records

Cost-related sources

F. Utility and telco transactions
G. Logistics data
H. Rental and wage bills

Analytics for liquidity profiling

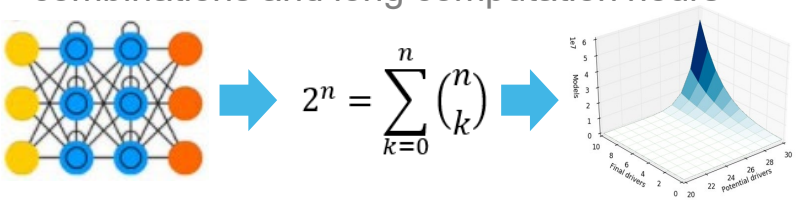
- Incoming cashflow stability
- Cost stability and predictability
  - Operating revenue
  - Liquidity gaps and seasonality
  - Liquidity term structure



Unsupervised learning: dimensionality reduction for macro data

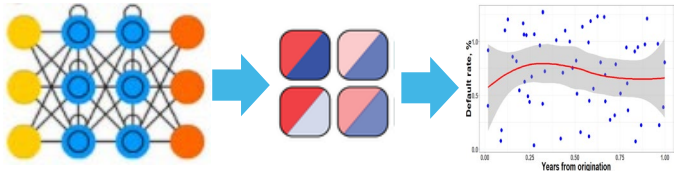
Problem statement

Multiple factors lead to millions of models combinations and long computation hours



ML-enabled solution

Reduce dimensionality of input factors by extracting only useful information

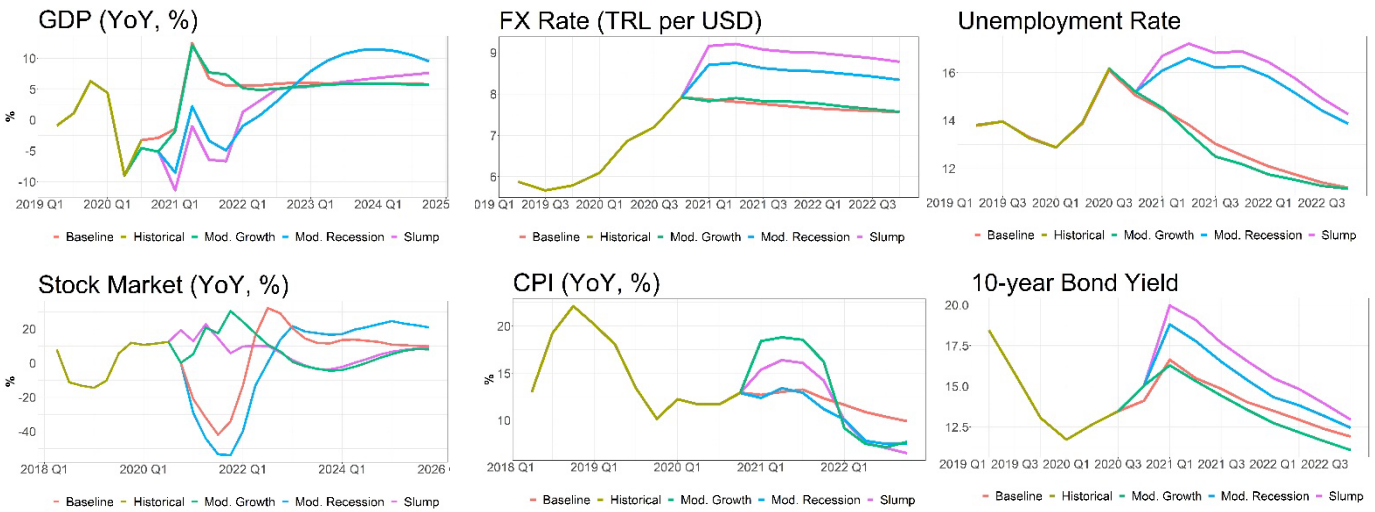


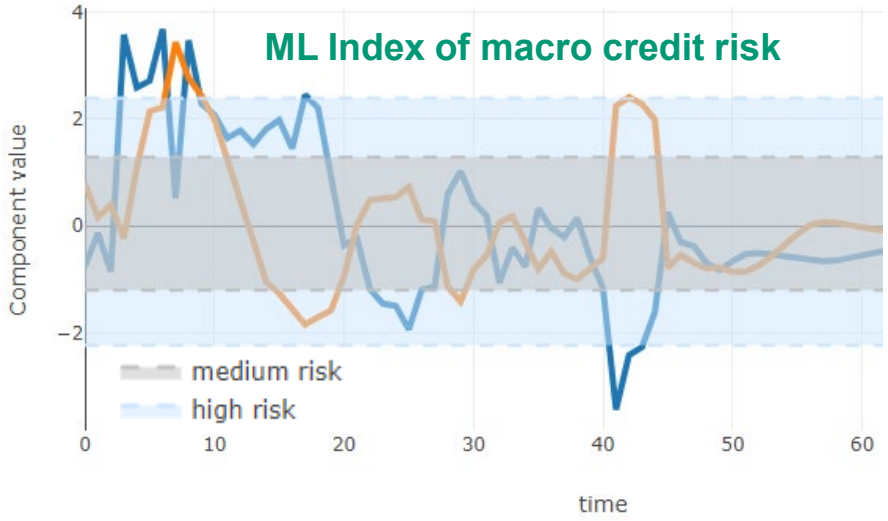
Example

For four macro factors, their transformations and two lags, the number of potential models exceeds **16 mln** (~2^24).

ML techniques allow us to include all the variables without having to estimate all those 16mln models.

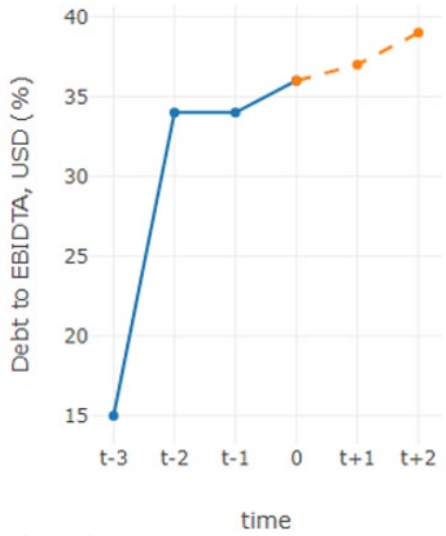
Macro factors, their transformations and lags

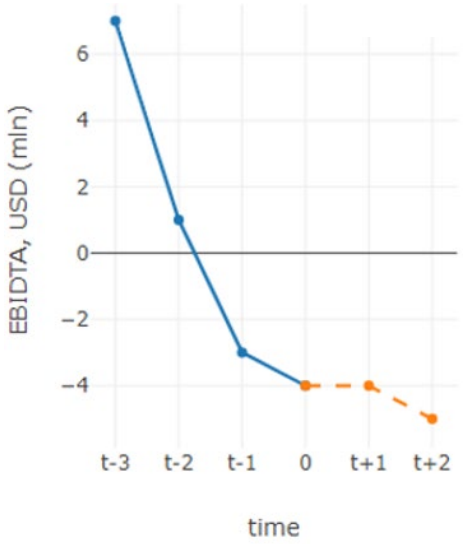


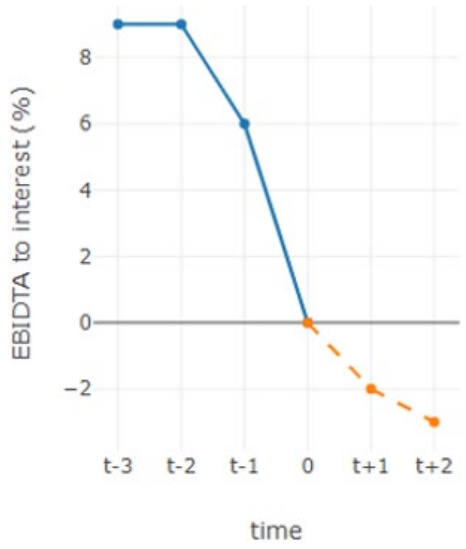


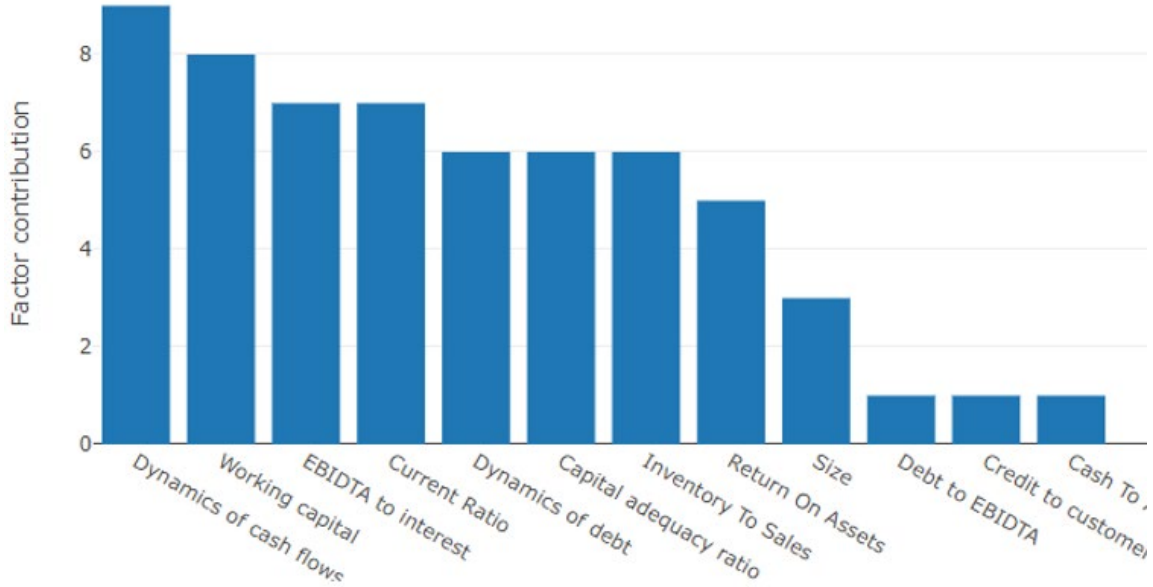
Forecasting macro-conditional financial performance

Examples of Ratios and their projections





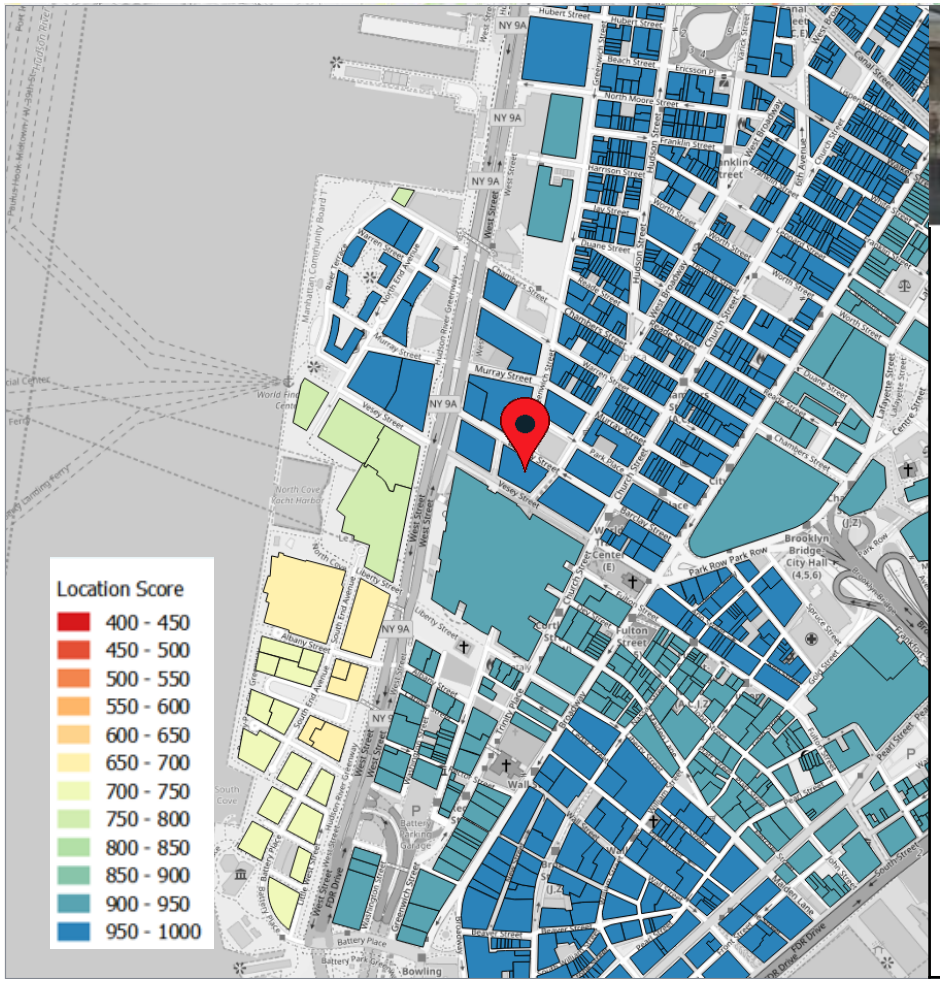




Contribution analysis

Location Score to determine CRE risk levels

Address: 250 Greenwich St, New York, NY 10007



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Per-capita Personal Income	$71,599
Business Establishments	463
Average Payroll	$6.8 bil
Distance to Subway	0.2 mi
Fair Market Rent	$58 psf
Nearby Restaurants	14
Violent Crime Rate	1.75‰

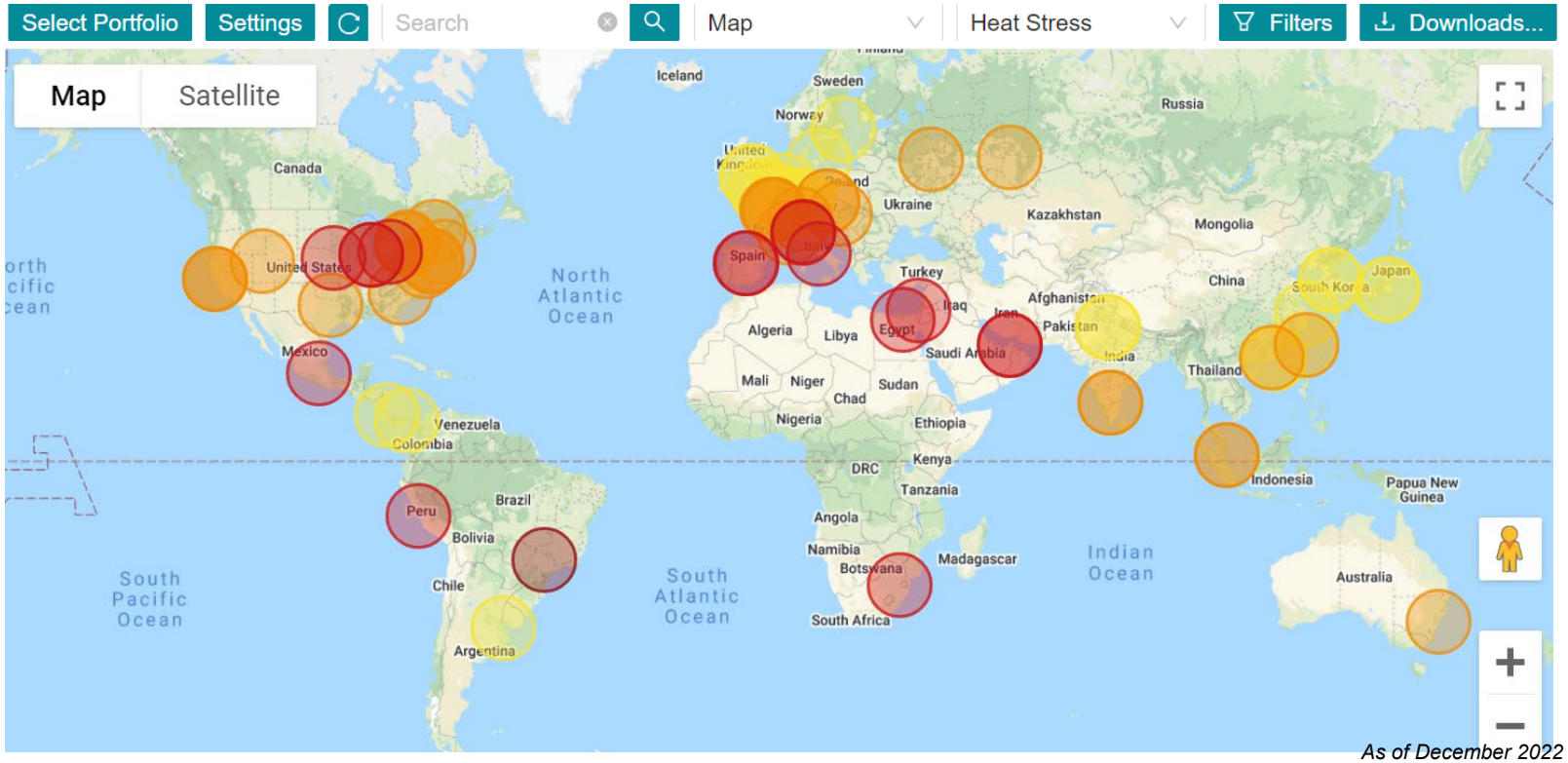
- ✓ Location score improves default prediction for Geo-sensitive industries (Hotels, Retail Outlets, etc.)
- ✓ Location score predicts firm revenue

Sales < $2 Mil	Sales > $2 Mil
• Gini coefficient 2% • Explain 10% variation in firm revenue	Muted effect

Climate (physical & transition) risks

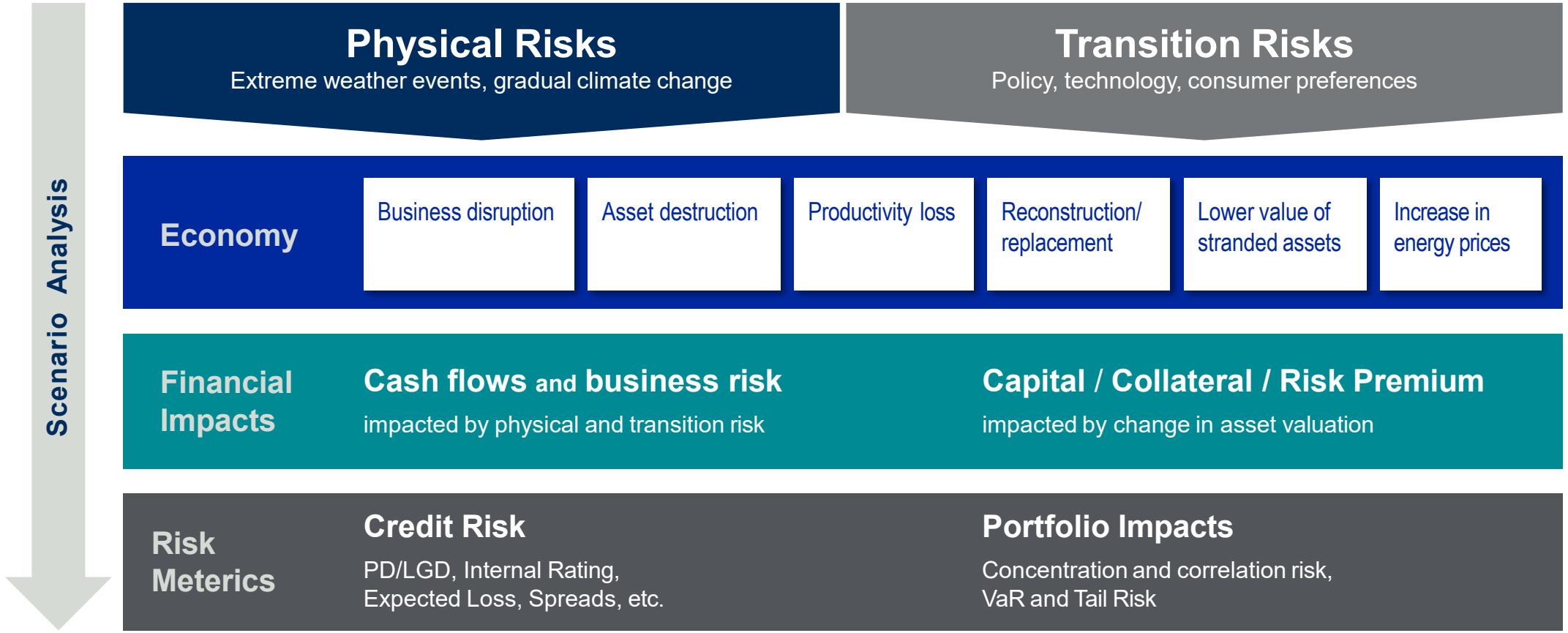
View locations on a global map to understand risk level by hazard type

- Portfolio and single asset exposure to climate risks – wildfires, heat stress, flooding, etc.
- Scores and risk management assessment for listed and unlisted companies, CRE properties and submarkets, markets, and regions
- Sovereign and sub-sovereign population-weighted scores
- Catastrophe models for a wide range of perils
- Climate-adjusted PDs & portfolio concentration analysis



As of December 2022

Impact of physical and transition risks on Probability of Default



ESG Credit Risk Scorecard Outputs

Easy to use and transparent framework

ESG INTEGRATION INTO CREDIT ANALYSIS

ESG CROSS-SECTOR FACTORS

Overall Environment Credit Risk Score

- Carbon Transition
- Physical Climate Risks
- Water Management
- Waste & Pollution
- Natural Capital
- Contribution to Sustainable Development

Overall Social Credit Risk Score

- Customer Relations
- Human Capital
- Demographic & Social Trends
- Health & Safety
- Responsible Production

Overall Governance Credit Risk Score

- Financial Strategy & Risk Management
- Management Credibility & Track Record
- Organization Structure
- Compliance & Reporting
- Board Structure, Policies & Procedures

ESG CREDIT RISK SCORE*

1. Credit Positive
2. Credit Neutral-to-low
3. Moderately Credit Negative
4. Highly Credit Negative
5. Very Highly Credit Negative

ESG CREDIT RISK RATING NOTCHING ADJUSTMENT

The ESG Credit Risk score translates to an appropriate notching adjustment to the baseline credit rating of an entity.

*The ESG Credit Risk Score is an output of the scorecard that transparently communicates the impact of ESG considerations on the credit rating of an entity. An industry adjustment is applied to certain NACE level 4 industry groups which are classified as more favourably and unfavourably impacted by ESG credit risk considerations in general. These industries include: i) Oil & Gas, ii) Pharmaceuticals, iii) Paper and Forest Products, iv) Media and Entertainment, v) Regulated Electric and Gas Utilities, vi) Financial Institutions.
The assignment of the final ESG Credit Risk Score within the final indicative range is also linked to the Overall ESG Score bucket from ESG Score Predictor.

3

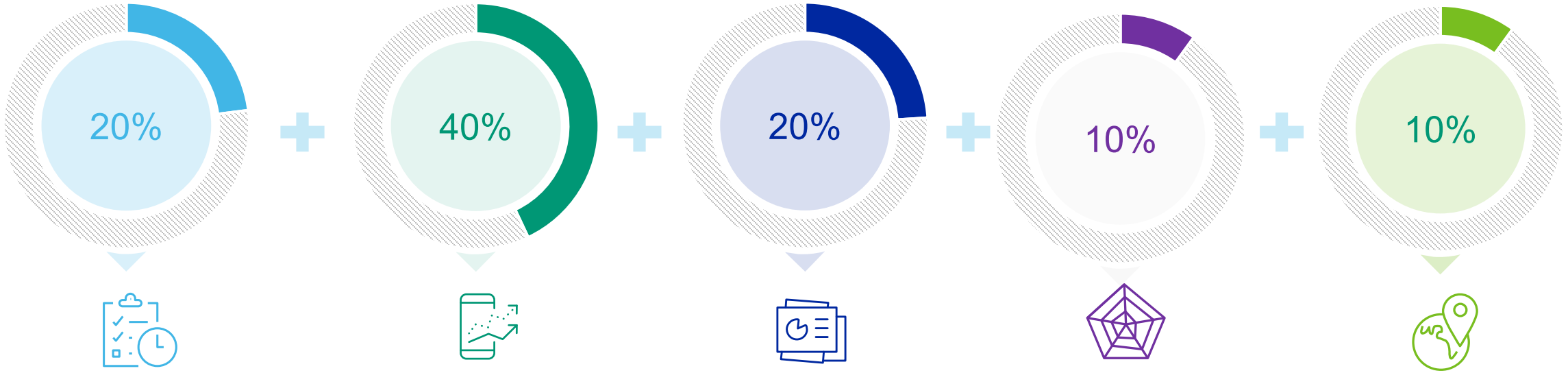
Using Signals for Better Decision-Making and Monitoring

Utilize Suitable Analytical Models

Generalized Additive Model	Alternative Approaches (e.g. Boosting)
With functional form, assumptions such as variable correlation matter.	No functional form, more data mining
Guided by economic theory and business intuition.	Results may not be intuitive, more of a “black box”
Does not work as well on complex relationships.	Fit complex, non-linear relationships better, easier to account for interaction across variables.
Spend more time on variable selection use fewer variables in the final model.	Spend less time on variable selection, use more variables.
Good performance	Performance can exceed GAM

Alternative Data – Combining Insights

*Key building blocks**



Fundamental Analysis

- Debt to Assets, Profit/Sales, Quick Ratio, Increase in Liabilities
- Financial Statement Quality
- Leverage and asset quality

Behavioral Profile

- Current past DPD
- Updated LTV, various debt coverage ratios
- Dynamics of utilization rate
- Transaction behaviour

KYC / KYS & Ownership

- Blacklists
- Sanction lists
- PEP list screening
- Strength of ownership tree

Other Alternative Data

- Cybersecurity risks
- Adverse media
- Supply chain
- ESG/Climate
- Location Scores

Forward-looking macro

- Commodity prices
- Stock market and contagion
- Outlook on industry performance

** Optimal weights are calibrated using customer data*

Panel Discussion

Corporate risk analysis using alternative data

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CEO, HBL UK

Omar Akkor
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Moody's Analytics

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Moody's Analytics

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