CreditRiskMonitor's New Confidential Financial Statement (CFS) Model

Executive Summary

As a matter of policy, CreditRiskMonitor regularly monitors and updates risk model performance. This whitepaper discusses the new Confidential Financial Statement Service (CFS) Risk Model. This new model is an extension of and consistent with the broader FRISK® score model.

Many CreditRiskMonitor clients can acquire financial statement information on private counterparties. The CFS Tool enables our clients to enter this information on a confidential basis and generate a risk score which is consistent with the risk profile of other businesses in their portfolio.

A new data point used in the new CFS risk model is the inclusion of the payment information driven PAYCE® score. The combination of financials with payment information reduces the early warning misses by 25%. A client who has financial information on a private business can improve their assessment of that business' risk profile beyond what the PAYCE® score alone can deliver, by using the CFS Tool.

The new CFS model improves the fraction of bankruptcies correctly classified in the high-risk red zone area of FRISK® from 70% to 85%. Meaning 85% of all bankruptcies were correctly identified, most of those being scored FRISK® = 1,2.

Model Data

CreditRiskMonitor® has offered the CFS Tool to its clients for several years. This tool lets users input financial information they have on a private business into a web form that is fed into CreditRiskMonitor's financial risk scoring engine to generate a FRISK® score and Altman Z''-Score for the subject business.

During the time the tool has been offered, several of the businesses entered have filed for bankruptcy, allowing the Company to rebuild a model that is specifically designed to more accurately assess the bankruptcy risk of private companies entered into the CFS Tool.

The data used in training the model was aggregated and anonymized. It contains 12,000 unique businesses with 168 bankruptcies captured from 2016 to 2022.

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A major unique feature of this model is its inclusion of trade payment data that CreditRiskMonitor® has on the subject business, when available. While we have found that payment behavior for public companies may be misleading of financial distress, for private businesses it is predictive. In addition, trade payment signals can provide more timely updates of a business's financial condition, as this information is updated monthly, rather than annually (most typically for private companies) or quarterly for financial statements.

The model also incorporates the business' agency ratings, when available. While this group represents a small population of the CFS universe, agency ratings continue to be very predictive for bankruptcy.

Modeling Approach

The model produces a score consistent with the FRISK® score, so the risk assessment in a client's portfolio can be compared to other businesses within the portfolio (e.g., public companies and private businesses with public debt) scored with the FRISK® score.

Like the FRISK® score the CFS model predicts the bankruptcy risk within a 12-month period from the score date. This probability is mapped to the same FRISK® buckets:

FRISK® Score	Probability of Bankruptcy Within 12 Months	
	From	To
10	0.00%	0.12%
9	0.12%	0.27%
8	0.27%	0.34%
7	0.34%	0.55%
6	0.55%	0.87%
5	0.87%	1.40%
4	1.40%	2.10%
3	2.10%	4.00%
2	4.00%	9.99%
1	9.99%	50.00%

High-Risk Red Zone*

*bankruptcy probability is at or above the 70-year long term average for U.S. public companies

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New Model Relative Performance

In developing models such as the CFS score, there is trade off on what probability value to use as the threshold for a high-risk company: the higher the value, the more businesses that eventually file for bankruptcy will be correctly classified as high risk at the time of scoring (True Positives). Unfortunately, a high threshold also increases the number of businesses that are classified as high risk but do not file for bankruptcy within the subsequent 12 months post-scoring (False Positives). A good model will minimize the number of False Positive businesses while maximizing the number of True Positive businesses, enabling users to concentrate on those businesses with material short-term financial risk while avoiding lower-value efforts evaluating the financial risk of businesses that will likely survive beyond the next 12 months.

Receiver Operating Characteristic (ROC) curves visualize this performance tradeoff by comparing the True Positive Rate for different models over the continuum of False Positive Rates. Models that generate a curve closer to the upper left corner of the graph are better as they have higher True Positive Rates at low False Positive Rates, thereby maximizing the classification efficacy. The overall performance of a particular model is characterized by its Area under the ROC Curve (AUC) score, ranging from 0.5 (low efficacy – a random coin flip) to 1.0 (full efficacy – no False Positives).

The ROC curve below shows the comparable performance of the current FRISK® score ("Current") and the updated CFS model ("CFS22"), featuring the additional payment and agency rating inputs, on the same population of CFS businesses.

For high-risk scores (near 0 on the x-axis), the two models perform similarly, but the CFS22 model's increased performance is evident in low-risk scores (to the right of 0.2 on the x-axis) where more bankruptcies are correctly classified.

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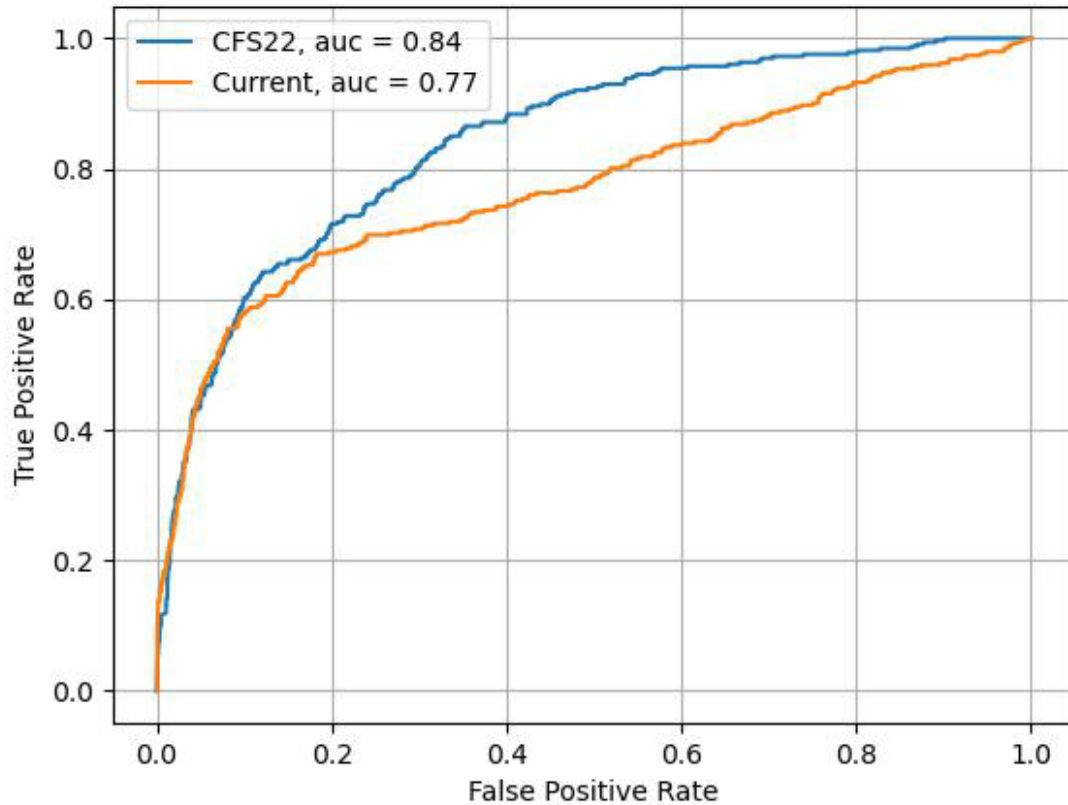
A clearer way to see the performance improvement or lift of the CFS22 model is to consider True Positive capture rate in each FRISK® score bucket. In this test, bankrupt businesses are scored at different points in time and businesses are then grouped according to their FRISK® or CFS22 score. We then count how many businesses actually file for bankruptcy within the next 12 months within each FRISK bucket to create cumulative capture curves across the entire scoring range.

FRISK Distribution of Bankrupt Businesses
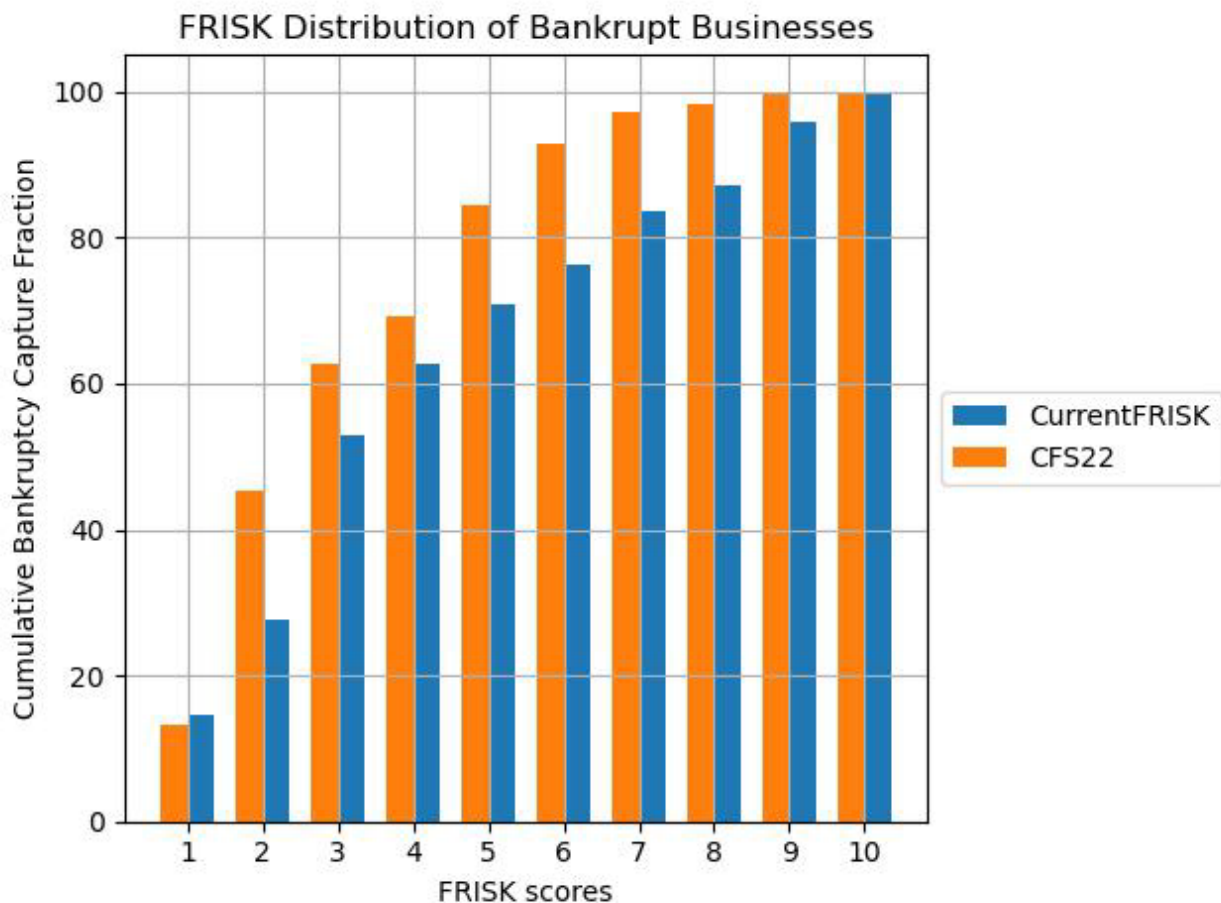
The graph above shows that the new CFS22 model captures about 45% of reported bankruptcies in the combined 1-2 bucket as compared to less than 30% capture rate using the current FRISK® score to assess CFS businesses. Businesses with scores of 5 or less (known as the "red zone" since they have above average probabilities of bankruptcy as compared to the long-term-70-year historical average) represent 85% of reported bankruptcies under the CFS22 model versus 70% for the current FRISK® model.

Conclusion

Updating CreditRiskMonitor's CFS model has led to higher capture rates of bankruptcy in private companies, with a remarkable upward spike in captures on applicable companies with lower FRISK® scores. CFS22 is proving to provide higher efficacy in captures compared to the previous CFS model, with lift in AUC from 0.77 to 0.84.

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