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POWERFUL DATA, SMARTER DECISIONS

Powerlytics Probability of Business Default Score

Challenge

Improve the effectiveness of small business loan underwriting by more successfully identifying the potential of default of a specific borrower.

Solution

The Powerlytics Probability of Business Default Score leverages the financial statement ratios from all 27M for profit businesses that are in Powerlytics Market Intelligence Platform to predict the probability of a business defaulting on a loan.

Principal Component Analyses (PCA) and logistic regression techniques are utilized to train the Powerlytics business financial ratios against a customer's portfolio to identify the combination of ratios that best differentiate and describe the Customer data and better predict default

A customer data file of funded loans and their performance was leveraged in multiple logistic regressions to determine the factors that best predict default with customer data only and the best performer of these regressions became the benchmark.

Once the benchmark was established, multiple logistic regressions consisting of a combination of customer data and Powerlytics business ratio data were performed to determine the business ratios that best correlate to loan performance and the best performers were plotted against the benchmark to determine which method yielded the highest KS score. Specific steps taken include:

1. Used loan records that had been funded and including loans written-off.
2. Divided the dataset into 75% training and 25% testing.
3. Built 3 logistic regression models using training data and only Customers data.
    - Logistic Regression #1 – Only included Customer's underwriting score
    - Logistic Regression #2 **(Best Performer in charts above)** – Included Customer's underwriting score, loan size, payback amount, average credit card sales and average bank deposits
    - Gamma Lasso Regression #3 – Included Customer's underwriting score, loan size, payback amount, average credit card sales and average bank deposits
4. Built logistic regression default models using Powerlytics' business ratio information.
    - Gamma lasso regression **(Financial Ratio Best Performer in charts above)** – Used Powerlytics Sales by Fixed Assets Ratio
    - Gamma lasso regression **(PCA Best Performer in charts above)** – Used PCA factors and Customer's underwriting score

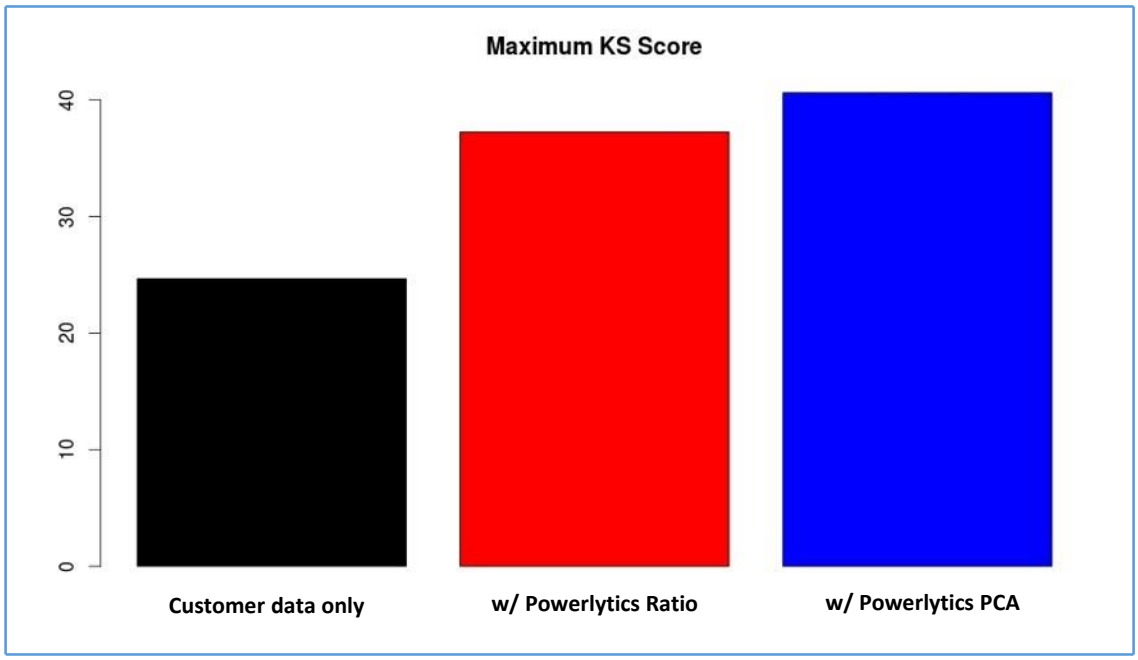
- **High factors**: Current Ratio, Quick Ratio, Sales by Fixed Assets Ratio
- **Low factors**: Cost of Sales by Inventory Ratio and Inventory Turnover

5. Used the best performer models and testing data to calculate the KS scores and ROC curves.

Results

Default models built with Powerlytics data improved KS scores by 15-20 points more effectively identifying customers that are likely to result in portfolio write-offs. These improved results allow the lender to either price for the additional risk in the loan or determine not to underwrite the loan in it's current form.

The following chart demonstrates the difference in KS score from the customer's original model versus the models that included the Powerlytics financial data.



Maximum KS Score (e.g. distance between ROC curves above) for the Powerlytics models are 15-20 points higher than a Customer-data only model

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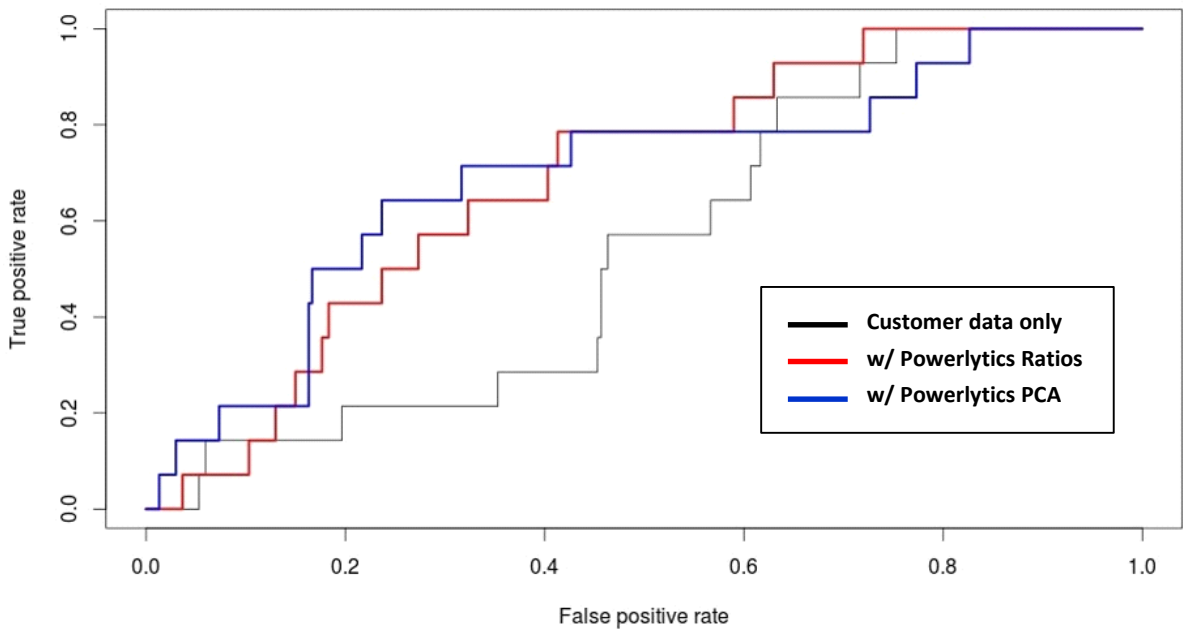
Powerlytics complete database of financial statements of all for profit businesses in the U.S. allowed the Powerlytics data scientist to determine which financial line items and ratios had the most significant impact in predicting default for the portfolio.

- The Powerlytics Sales by Fixed Assets ratio correlates to increased default risk and provides significant predictive modelling attributes
- A Principal Component Analysis on the Powerlytics business ratios identified the high and low factors that increase default risk and provide significant modelling attributes as follows:
  - **High factors**: Current Ratio, Quick Ratio, Sales by Fixed Assets Ratio
  - **Low factors**: Cost of Sales by Inventory Ratio and Inventory Turnover Ratio



The Powerlytics models demonstrate a higher ability to correctly identify true "default" cases (e.g. loans that were written off)