

# Project Final Report



## Project:

### Cross Sell Strategy Enhancement and Model Building

Fleet Core Project 1

Department of Economics and Business Analytics, University of New Haven

BANL6430: Database Management for Business Analytics

Dr. Pindaro Demertzoglou

## Executive Summary

The Fleetcor Cross-Sell Strategy Optimization Project aimed to enhance the company's approach to promoting Universal Cards to existing Fuel-Only customers. Leveraging advanced predictive modeling, KPI analysis, and data visualization, our goal was to identify high-potential accounts for inclusion (swap-in) while reducing risk by filtering out underperformers (swap-out). The initiative focused on optimizing the eligibility model, understanding spend-risk dynamics, and maximizing net financial gain.

Our final solution centered around a Random Forest model, which achieved a predictive accuracy of **99.33%**, outperforming the baseline Logistic Regression model. The most influential variables identified were DAYS\_PAST\_DUE, FUEL\_SPEND\_RATIO, and CREDIT\_LIMIT. A key insight revealed that **Credit Line Utilization (CLI%) above 50K**

**significantly increases write-off risk**, while the optimal profitability range lies between **20K and 40K**.

Adjusting the model's probability cutoff from 0.5 to 0.4 and re-evaluating eligibility criteria resulted in **31.59K profitable swap-ins**, a **net CLI% reduction of 2M**, and an estimated **net gain of \$1.2M**. The model outputs were visualized using a Power BI dashboard that tracked swap strategies, CLI%, default risk, and segment performance in real time.

## Final Report Questions and Responses

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### 1. Review of Existing Eligibility Criteria

The current eligibility model places significant weight on DAYS\_PAST\_DUE (~0.38), delinquency, and credit utilization metrics. However, it underutilizes behavioral indicators such as FUEL\_SPEND\_RATIO and CLI\_UTILIZATION. Our analysis, using a Random Forest model, highlighted these two as highly predictive of Universal Card suitability, with FUEL\_SPEND\_RATIO contributing 0.21 and CREDIT\_LIMIT 0.12.

The dependent variable used was `is_universal_card`, representing whether a customer should be classified as a Universal Card holder. This aligns with the business objective of identifying cross-sell targets from Fuel-Only cardholders.

**Models Used:** Random Forest, Logistic Regression

**Tools Used:** R, Python, Power BI, Excel

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## 2. Identification of Key Performance Metrics

The most important KPIs driving cross-sell analysis included:

- **Total Net Gain:** ~\$1.17B
- **Total Write-Off:** \$37.81M
- **CLI Utilization:** \$1.14M
- **Total Customers Analyzed:** ~180K

These metrics, visualized in Power BI, guide decision-making on swap-in/swap-out strategies. We recommend adding segment-specific ROI, normalized CLI spend, and rolling delinquency windows to enhance insight granularity.

**Models Used:** KPI tracking, threshold simulation

**Tools Used:** Power BI, Excel, Python

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## 3. Sensitivity Analysis (Bad Rate vs CLI%)

The sensitivity analysis demonstrated that **CLI% over 50K** leads to steep increases in write-offs. However, those customers also bring higher spending. The optimal range for balanced profitability and risk lies between **20K and 40K**.

Fleetcor should monitor CLI trends and set triggers for customers nearing the high-risk utilization threshold, enabling proactive interventions.

**Models Used:** CLI threshold simulation, gain/loss analysis

**Tools Used:** Power BI, R

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## 4. Spend and Loss Differences by Card Type

Universal Cardholders had an average spend of **\$111K**, significantly higher than Fuel-Only users at **\$43K**, but their average write-off was also slightly elevated (**\$2.97K vs \$2.21K**). This indicates high potential with modest risk.

Cross-sell targeting should prioritize Fuel-Only customers demonstrating similar behavior profiles to Universal users, with appropriate CLI controls to prevent exposure spikes.

**Models Used:** Grouped comparison analysis

**Tools Used:** Power BI, Python

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## 5. Cross-Sell Performance Dashboard

The Power BI dashboard provided a real-time interface for decision-makers, offering tabs like:

- *Cross-Sell Eligibility Effectiveness*
- *CLI% vs Bad Rate*
- *Model Results*
- *Eligibility Policy Impact*

It supported identification of profitable swap-in candidates and visualized predicted outcomes and risk metrics. For greater utility, real-time updates and alerts are recommended.

**Models Used:** Predictive visualization & policy simulation

**Tools Used:** Power BI, R

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## 6. Re-evaluation of Eligibility Variables

Random Forest analysis confirmed DAYS\_PAST\_DUE, FUEL\_SPEND\_RATIO, and CREDIT\_LIMIT as top features. Less relevant variables like BAL\_90\_PLUS (0.02) were removed. This reduced model noise and improved accuracy.

We recommend integrating external features such as **industry type**, **merchant category**, and **tenure** in future model iterations.

**Models Used:** Feature selection and pruning

**Tools Used:** R, Python

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## 7. Application of Revised Eligibility Model

After adjusting model thresholds, the revised policy yielded:

- **Swap-Ins:** 31.59K

- **Swap-Outs:** CLI reduction of 2M
- **Spend Gain:** \$15M
- **Write-Off Risk:** \$11.8K
- **Net Gain:** ~\$1.2M

These results prove that smart eligibility rules can enhance profitability without significantly increasing risk.

**Models Used:** Scenario testing & gain calculation

**Tools Used:** Python, Power BI, Excel

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## 8. Adjustment of Cutoff Values

The classification cutoff was lowered from **0.5 to 0.4**, significantly increasing the pool of eligible accounts. While risk increased slightly, the tradeoff yielded a positive net gain due to higher customer inclusion.

Going forward, Fleetcor should test dynamic cutoffs quarterly, adjusting based on churn, write-offs, and campaign returns.

**Models Used:** Threshold optimization, ROC evaluation

**Tools Used:** R, Excel

### Dashboard Overview and Interpretation

A Power BI dashboard was developed with the following tabs:

#### 1. Cross-Sell Eligibility Effectiveness

- Visualizes write-off amounts by card type and CLI utilization
- KPIs: 180K customers, 1.14M CLI utilization, \$37.81M write-offs
- Shows strong link between CLI% and default risk

#### 2. Key KPIs Driving Cross-Sell

- Highlights: 118.45K accounts, \$4.31K avg write-off, \$154.92K avg spend
- Pie chart shows 92.24% Universal Card dominance
- Reinforces segmentation focus

#### 3. CLI% Impact on Bad Rate

- Line and scatter plots track how increasing CLI% affects spend and write-off

- CLI% >50K is high-risk; optimal range is 20K–40K

#### **4. Performance: Fuel vs. Universal Cards**

- Bar and stacked charts compare spend and loss
- Universal Cards drive higher spend and moderate risk

#### **5. Model Prediction Results**

- Model assigns probability scores to each account
- Visual distribution of fake\_acctcode and prediction labels

#### **6. Eligibility Policy Change Impact**

- Swap-In: 31.59K | Swap-Out: 2M CLI% | Net Impact: -170.67K
- Tables detail spend/loss for affected accounts

#### **7. Summary**

- Portfolio KPIs: 118K customers, \$1.17B gain, \$37.81M loss
  - Side-by-side breakdown: Avg Spend, CLI, Loss by card group
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#### **9. Final Recommendation**

Fleet core should:

- Target customers with predicted probability **>0.7**
- Cap CLI% at **40K for mid-risk profiles**
- Integrate external variables like **company size, industry, and payment terms**
- Automate real-time CLI monitoring and retrain the model semi-annually

This strategy is projected to enhance net gain, expand qualified customers, and reduce portfolio volatility.

**Models Used:** Final segmentation logic, probability scoring

**Tools Used:** R, Power BI, Python