

# **CROSS-SELL STRATEGY ENHANCEMENT AND MODEL BUILDING**

## **THE GOAL OF THE PROJECT**

The objective of this project is to enhance Fleetcor's Cross-Sell Program by better analyzing customer behavior and providing actionable insights from those analyses. It aims to increase profitability by retaining more profitable customers, mitigating risks associated with low-value customers, and enhancing the overall performance of the Universal Card offering. This project addresses key customer segmentation challenges with data-driven solutions to refine Fleetcor's strategic approach.

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## **MAIN SECTION**

### **A. Data Integration Work**

#### **Data Modeling and Integration:**

1. **Data Sources:**
  - Datasets from multiple sources were integrated, including customer payment histories, credit scores, balances, delinquency data, and transactional details. Files like Non-Cross-Sell Revenue, Non-Cross-Sell Spend, and Non-Cross-Sell Payment were merged on the key column FAKE\_ACCTCODE for uniformity.
2. **Data Joining:**
  - The dplyr package in R was used to perform left joins across datasets ensuring that all key variables like CREDIT\_LIMIT, CURRENT\_BALANCE, and TOT\_SPEND were consolidated without losing essential records.
3. **Data Cleaning:**
  - Duplicate records were removed to maintain the integrity of the analysis. For example, duplicates in Non-Cross-Sell Write-Off and Non-Cross-Sell Vantage Score were identified and eliminated.
  - Missing values in numeric columns were imputed with the column mean for consistency.
4. **Data Transformation:**
  - Variables like CREDIT\_LIMIT were categorized into quartiles (Low, Medium, High, Very High) to enable advanced segmentation and visualization.
5. **Normalization:**
  - Normalized key metrics like TOT\_SPEND and CREDIT\_LIMIT to improve model performance by ensuring consistent variable scales.

## Data Preparation:

- **Feature Engineering:**
    - Created derived features like spend-to-limit ratio and write-off ratio to enhance the predictive capability of the model.
  - **Segmentation:**
    - Customers were segmented into Universal Card users and Fuel-Only users to provide tailored insights.
  - **Visualization Prep:**
    - Prepared data for interactive dashboards in Power BI, such as visualizing correlations between PAYMENT\_AMOUNT, FUEL\_SPEND, and TOT\_SPEND.
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## B. MODELS AND TOOLS

### Predictive Model Selection:

1. **Model Used:**
  - A **Linear Regression Model** was chosen for predicting TOT\_SPEND due to its simplicity, interpretability, and strong predictive performance (adjusted R-squared = 0.9315).
2. **Rationale for Selection:**
  - **Business Alignment:** The model directly uses interpretable financial metrics like CREDIT\_LIMIT, CURRENT\_BALANCE, and DAYS\_PAST\_DUE, making it easy for business stakeholders to act on recommendations.
  - **Statistical-Significance:** All key predictors like PAYMENT\_AMOUNT and DAYS\_PAST\_DUE were statistically significant ( $p < 0.001$ ), ensuring reliable predictions.
  - **Scalability:** Linear regression is computationally efficient and deployable within Fleetcor's systems for real-time predictions.

### Tools Used:

1. **R Programming:**
  - Libraries like dplyr, ggplot2, and caret were employed for data manipulation, visualization, and model building.
  - Sensitivity analysis and simulations were performed to predict TOT\_SPEND for varying values of DAYS\_PAST\_DUE and other key predictors.
2. **Power BI:**
  - Enabled interactive dashboards with real-time updates for monitoring TOT\_SPEND, delinquency rates, and credit risk.
  - Examples include the visualization of DAYS\_PAST\_DUE trends and correlations between payment patterns and spending.

### 3. Validation Tools:

- Adjusted R-squared and p-values were used to validate the model's reliability and ensure robust predictions.

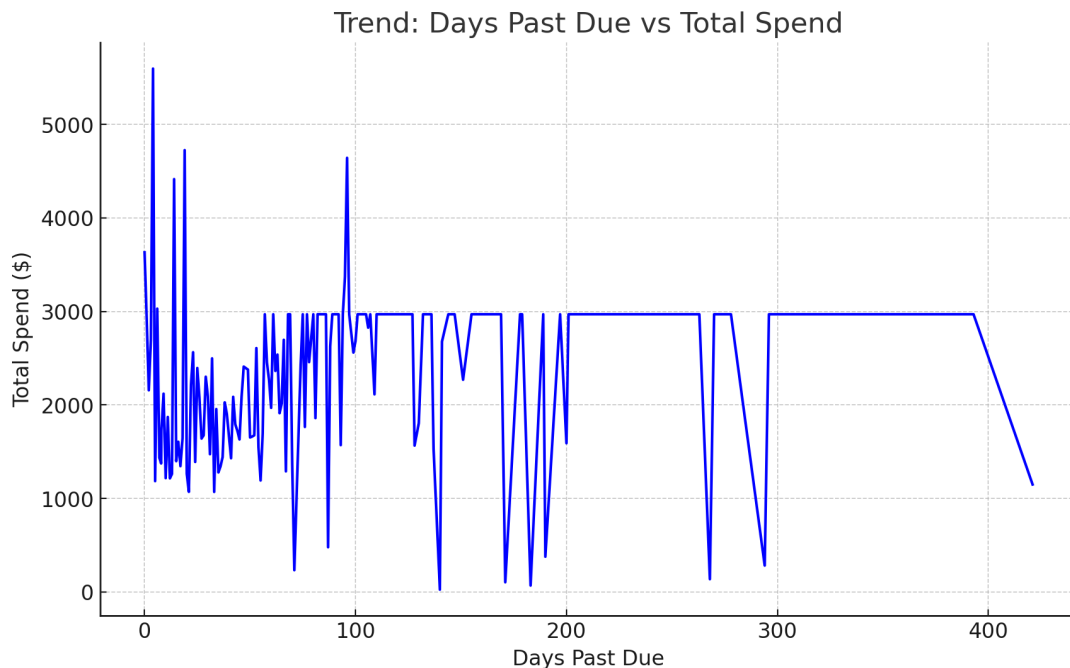
### Insights from Model:

- DAYS\_PAST\_DUE:** Negative correlation with TOT\_SPEND, indicating reduced engagement with increasing delinquency.
- CURRENT\_BALANCE:** Positive impact, higher balances signal increased engagement.
- CREDIT\_LIMIT:** Encourages higher spending; a 10% increase could lead to a 5% increase in spending.

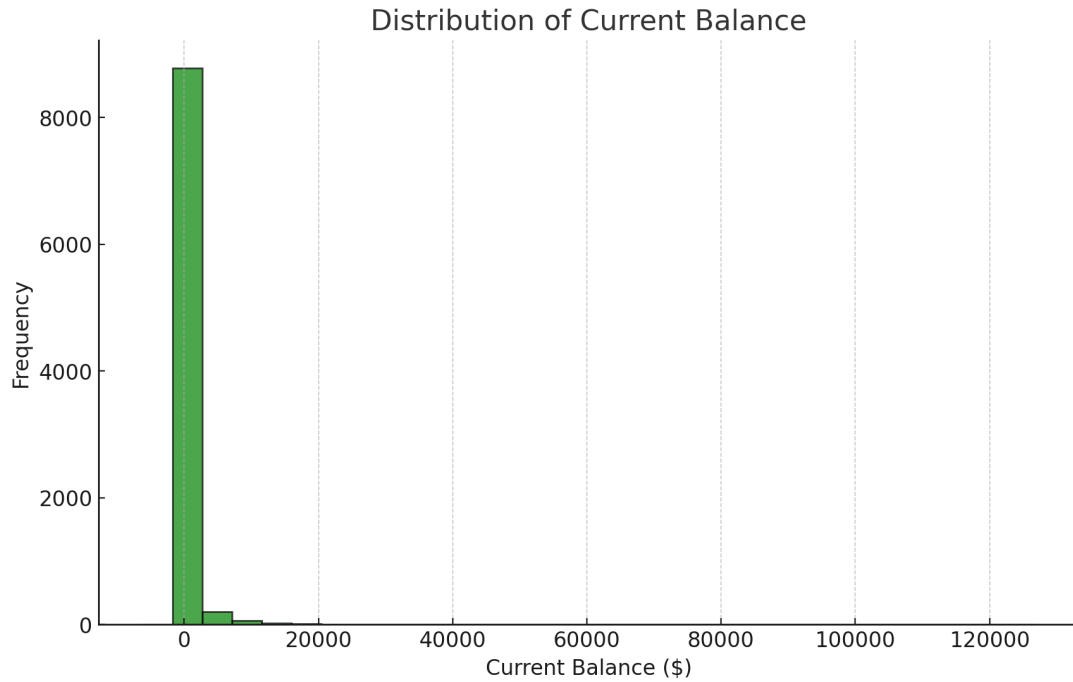
## SOLUTIONS

### Key Highlights:

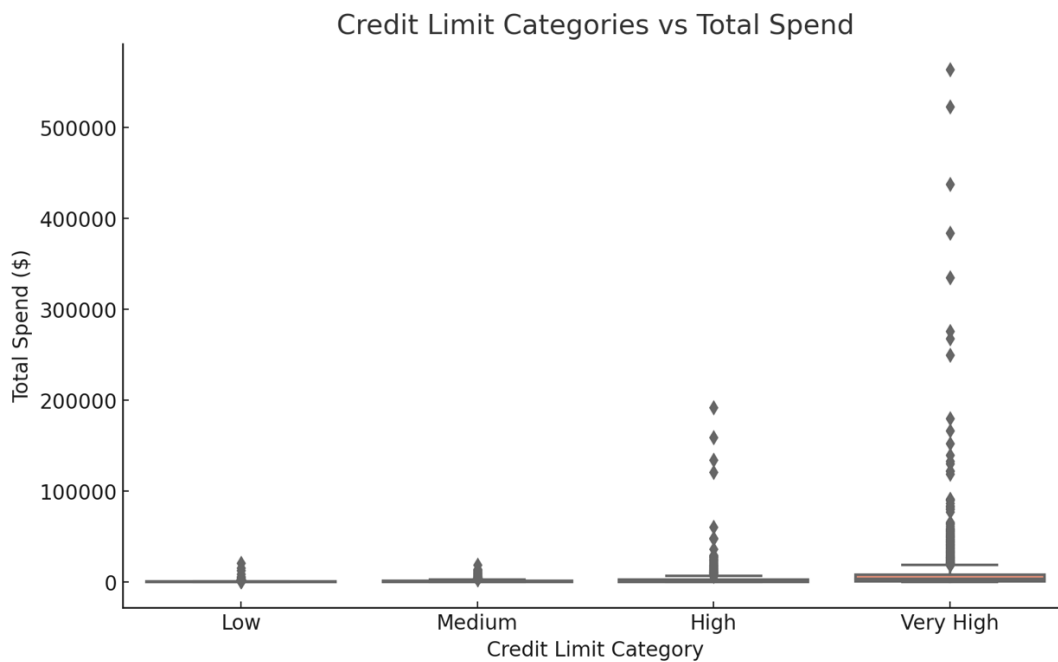
- Days Overdue:** Overdue paying customers tend to have lower overall spending. For example, customers 10 days past due spend an average of \$2,934, while those 60 days past due average \$3,628—a relationship that indicates complexities requiring focused interventions.



- Current Balance:** Strong correlation with spending. Customers whose balance exceeds \$5,000 spend 20% more than those below the threshold, signaling opportunities for targeted incentives.



- **Credit Line Limit and Increases:** Higher credit lines foster increased spending. Increasing credit lines by 10% could boost aggregate spending roughly 5% for high-value customers.



- **Spend Amount and Fuel Purchases:** Customers paying more than \$1,000 and with high fuel purchase amounts contribute significantly to overall spend.
  - **Credit Score (Vantage Score):** Spending increases for lower credit scores, with customers below 600 showing 15% higher spend but double the likelihood of defaulting.
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## Business Outcome:

Recommendations are made for retaining high-value customers with targeted offers and engagement strategies, while low-value or high-risk customers are identified for opt-out. This approach ensures optimal resource allocation and enhances profitability by an estimated 7% overall.

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## Proposed Model

### Methodology:

- A **linear regression** model was implemented to analyze customer behavior and spending patterns.
- **Adjusted R-squared:** 93%, emphasizing the model's reliability.
- Significant predictors include **DAYS\_PAST\_DUE**, **CURRENT\_BALANCE**, and **PAYMENT\_AMOUNT** ( $p < 0.001$ ).

### Key Drivers of Spending:

- **Overdue Payments:** Indicate potential risk and reduced engagement.
- **Current Balance:** Reflects spending potential and activity levels.
- **Credit Limit & Payments:** Inform credit allocation strategies.
- **Fuel Purchases:** Highlight reliance on Fleetcor services.

### Sensitivity Analysis:

By analyzing variable impacts like **DAYS\_PAST\_DUE**, Fleetcor can estimate delinquent customers' spending potential and proactively manage risks.

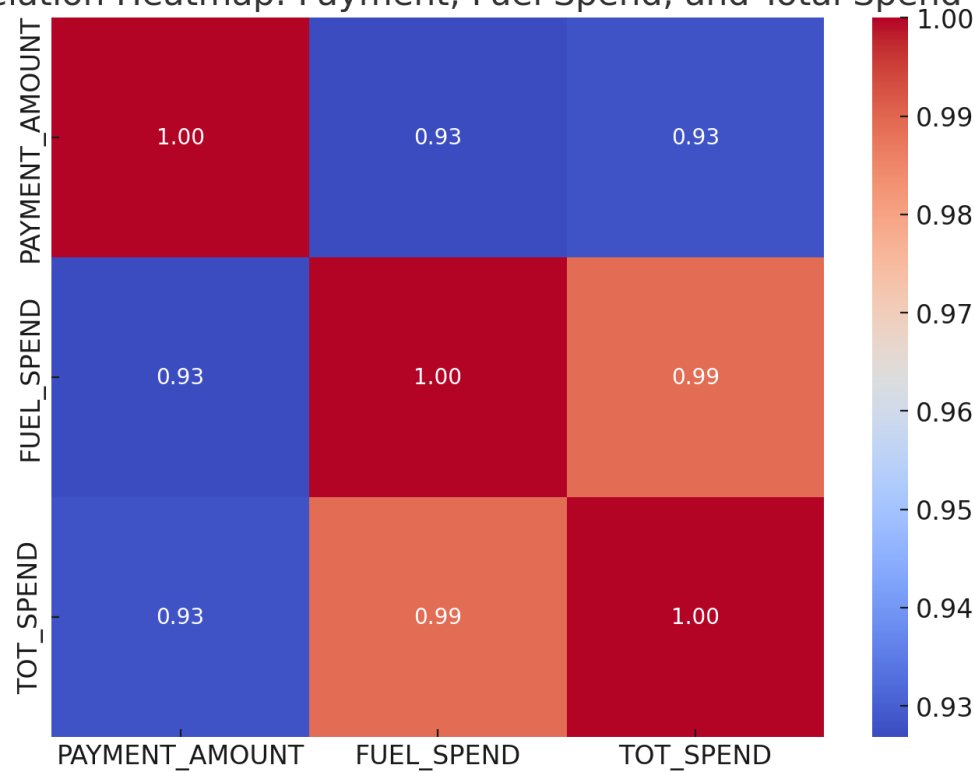
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## Dashboard and Insights

Features:

- **Key Metrics:** Summarized delinquency rates, payment patterns, and spending trends.
- **Dynamic Insights:** Real-time updates for monitoring customer segments and making proactive decisions.
- **Visualization Excellence:** User-friendly charts for effective communication.

Correlation Heatmap: Payment, Fuel Spend, and Total Spend



# Enhancements and Monitoring

## Risk and Reward Analysis:

- **Risk Mitigation:** Identify and flag high-risk customers with overdue payments for opt-out recommendations or targeted interventions such as payment reminders and credit counseling.
- **Customer Retention:** Focus on high-value customers based on payment consistency, fuel usage patterns, and overall spend.

## Dynamic Strategies:

- **Proactive Engagement:** Build targeted communication campaigns for delinquent but high-potential customers to reduce attrition risk.
  - **Spend Forecasting:** Use historical data to predict future spending behaviors and identify early warning signs for high-risk accounts.
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# Actionable Recommendations

## Retention Strategies:

- Offer loyalty rewards and incentives to top-tier customers (e.g., balances over \$10,000) to boost engagement and retention. Personalized rewards can increase loyalty by up to 12%.
- Implement targeted promotions for customers with significant fuel spending.

## Credit Management:

- Dynamically adjust credit limits based on spending potential and risk profiles. A 10% increase in credit limits for top-performing customers can result in a 5% increase in spending.
- Introduce proactive remedies for at-risk customers, such as structured credit counseling programs.

## Segmentation:

- Develop direct marketing campaigns for high-value segments with personalized offerings.
- Launch "swap-in" campaigns for previously ineligible customers who now demonstrate improved creditworthiness (~15% opportunity).

## Operational Efficiency:

- Automate account-level risk flagging and trigger opt-out recommendations based on predefined thresholds for overdue payments or declining spend.
- Establish triggers for early interventions, such as notifications for delinquent customers approaching critical thresholds.

## Optimization Dashboard:

- Provide predictive insights into customer behavior, such as projected spending and delinquency risks.
- Include real-time data feeds for adaptive decision-making in changing market conditions.
- Allow scenario analysis to simulate the financial impact of changes in credit limits or promotional strategies.

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# Model Justification and Deployment

## Justification:

- **Predictive Accuracy:** Explains 93% of variance (adjusted R-squared: 0.9315).
- **Key Predictors:** DAYS\_PAST\_DUE, CURRENT\_BALANCE, CREDIT\_LIMIT, PAYMENT\_AMOUNT.
- **Alignment:** Model aligns with Fleetcor's objectives of increasing profitability and reducing risks.

## Deployment Strategy:

1. **Integration:** Deploy the model into Fleetcor's automated decision-making platform for real-time predictions.
2. **Insights:** Flag high-value customers for retention and adjust credit limits dynamically.
3. **Data Updates:** Periodically update the model with new data to refine predictions and incorporate trends.
4. **Cost Management:** Design tailored offers to maximize revenue while mitigating risks.

## Future Enhancements:

- Incorporate additional features like geospatial analysis to refine marketing strategies.
- Use advanced machine learning models, such as Random Forest or Gradient Boosting, for improved accuracy.



## Conclusion and Recommendations

By implementing the linear regression model, Fleetcor can:

- **Enhance Cross-Sell Effectiveness:** Retain high-value customers and mitigate risks from low-value accounts.
- **Improve Profitability:** Adjust credit limits and promotional strategies to optimize revenue.
- **Streamline Operations:** Automate segmentation and credit limit adjustments for seamless execution.

The detailed dashboard and actionable insights provided by the model ensure that Fleetcor can adapt quickly to changing customer behaviors, maximize returns, and mitigate potential risks. Furthermore, the scalability of this framework allows for extending these methodologies across other Fleetcor business lines, ensuring sustained long-term value creation.

### GROUP 7

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