

## U.S. and Canada Profitable Retail Store Case Study

U.S. & Canada Store  
Locations

Exploratory Data  
Analysis

Linear Regression

Cluster Analysis

Cluster analysis results

Final results and  
recommendations



### Mapping Retail Profitability: Geographic Insights on U.S. & Canada Store Locations

This **interactive map visualization** highlights retail store locations across the U.S. and Canada, providing insights into **regional market presence and profitability trends**.



By analyzing **geographic distribution**, this study explores **key factors influencing profit margins** across different locations. Using **exploratory data analysis, regression modeling, and geospatial insights**, this analysis aims to uncover **patterns in store performance and regional profitability**.



The final recommendations will provide **data-driven strategies to optimize retail performance and profitability**.

#### Store Locations (Country/Region)

- Canada
- United States



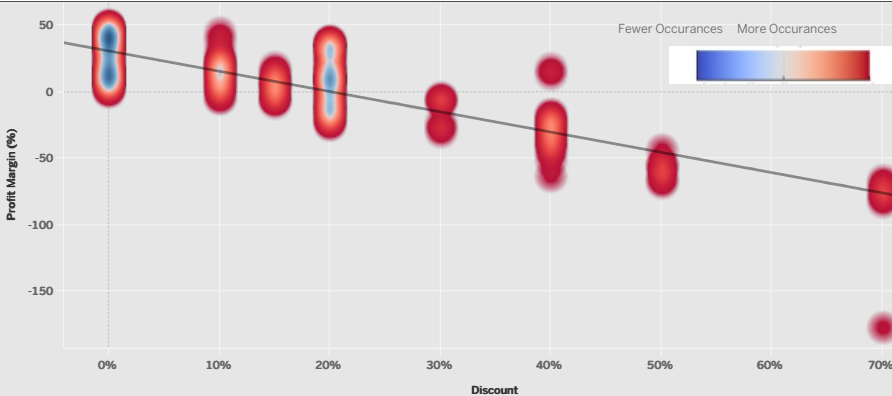
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Visualizing Key Relationships: Analyzing Trends in Discounting, Sales, and Profitability

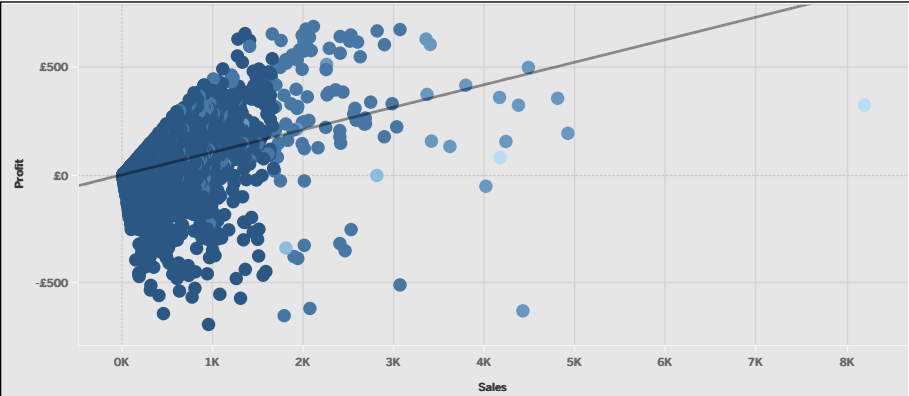
Profit Margin vs. Discount Analysis

You can clearly observe a 'strong negative correlation' between Discount rates and Profit Margins (%).  
"suggesting that larger discounts are consistently associated with reduced profit margins".



Profit vs. Sales Relationship

You can see only a 'weak to moderate positive correlation' between Sales and Profit  
"suggesting that higher sales are generally associated with increased profit, but not in a strictly linear manner".



This lead to the hypothesis → 'H0 = Discount rates do not significantly impact profit margins (%)'

Monthly Sales Trends

- This data was 'also' analyzed to identify seasonality and overall sales volume but does not directly contribute to profitability analysis
- This visualization explores sales trends over time

[View Sales Trends Analysis](#)

Category Sales Distribution

- This data was 'also' examined to assess understanding which categories drive revenue, but it does not establish a link between discounting and profitability.
- This chart explores Sales performance by product category.

[View Profit vs. Sales](#)

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Exploratory Data Analysis

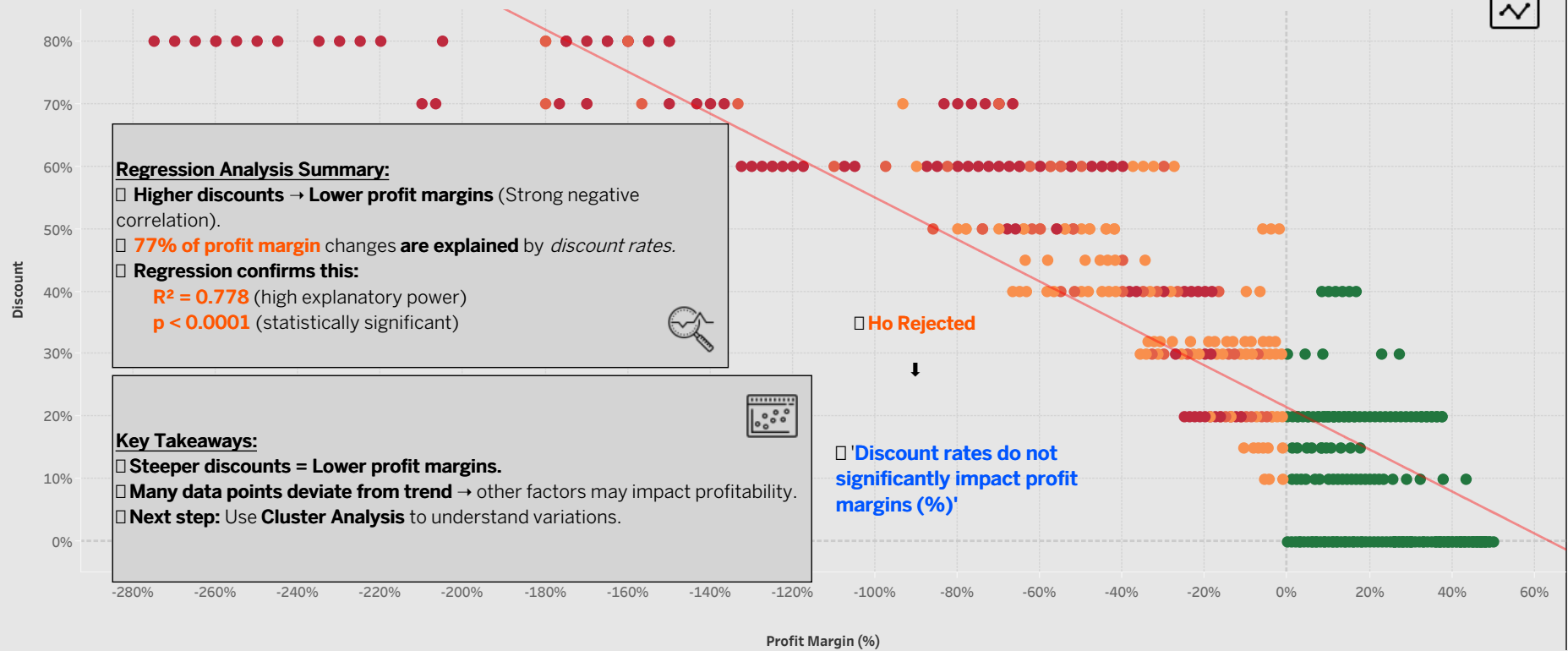
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Discount vs Profit Margin (%)



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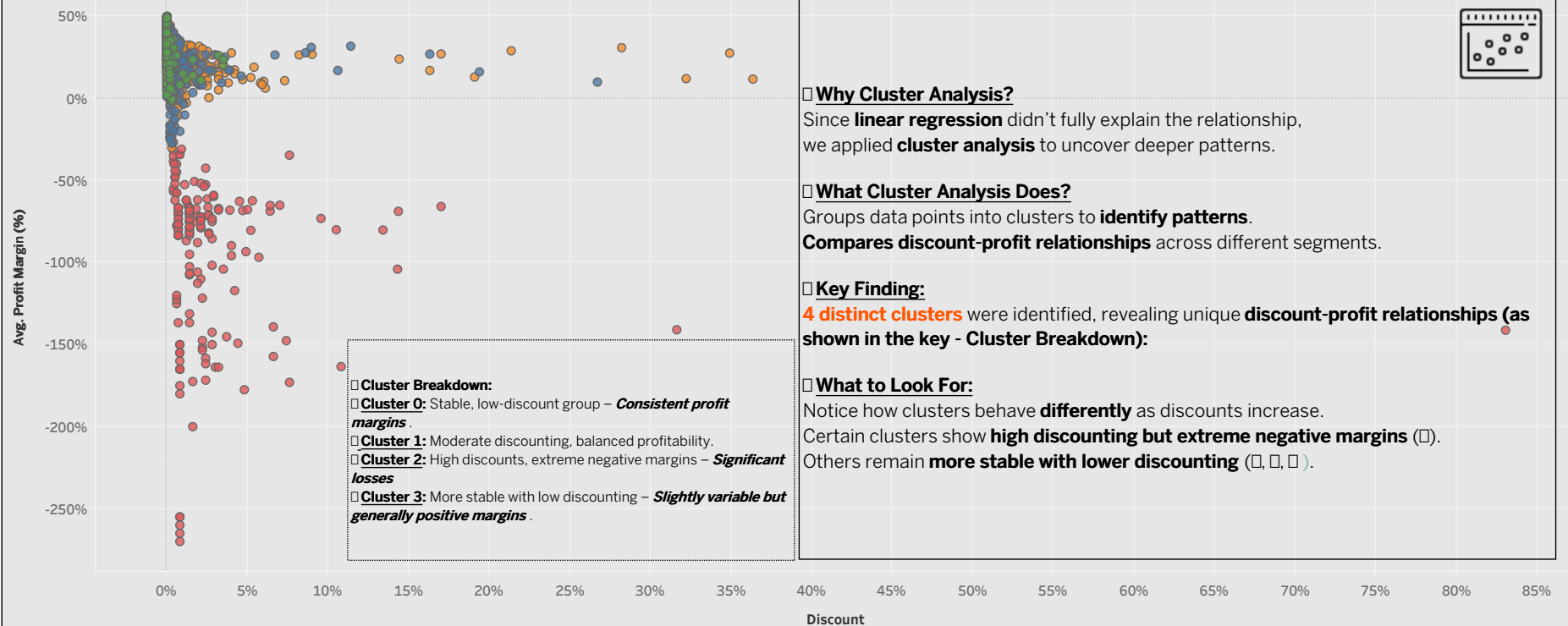
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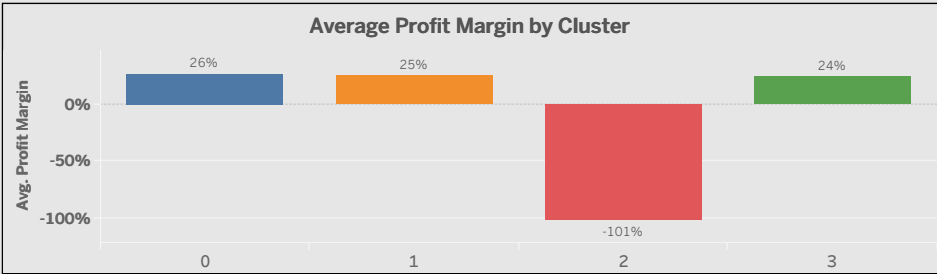
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### Cluster Analysis Profit Margin (%) vs Discount



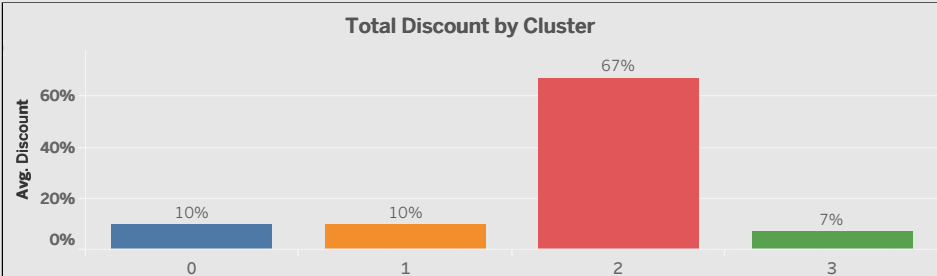
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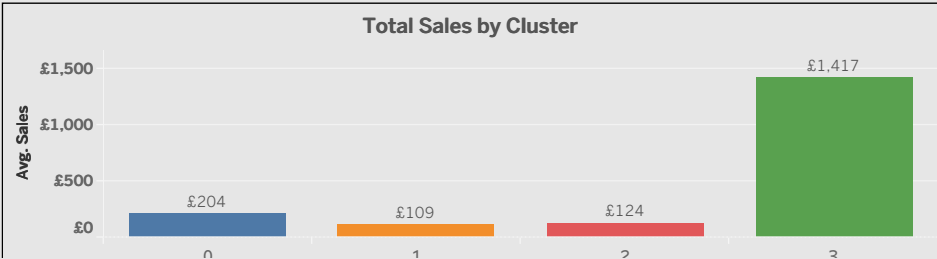
Average Profit Margin by Cluster

- Cluster 2 → Most significant negative profit margin due to high discounting (or cost inefficiencies).
- Clusters 0, 1, and 3 → Relatively stable profit margins, suggesting better pricing strategies.
- Key Warning: Cluster 2's extreme discounting strategy leads to significant profit margin losses.



Total Discount by Cluster

- Cluster 2 → Highest average discount (67%), aligning with low profit margins.
- Clusters 0, 1, 3 → Maintain lower discount levels, supporting sustainable profitability.



Total Sales by Cluster

- Cluster 3 → Achieves the highest average sales (£1,417), reflecting strong revenue performance.
- Caution: High sales alone do not improve profitability if discounting is too aggressive.
- What's Driving This? Further analysis is needed to determine what's fueling this trend.

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### Key Insights

- **Geospatial Analysis:** Higher discount areas statistically exhibit *lower profitability*, especially in competitive markets.
- **Regression Analysis:** **77%** of profit margin variance is explained by discounting, confirming a *strong negative correlation* between discounts & profitability.
- **Cluster Analysis (Profit Margin Variability):**
  - Cluster 2: □ High discounts → High volatility & low profitability □
  - Cluster 3: □ Moderate discounts → Stable & high sales □
  - Clusters 0 & 1: □ Lower discounts → More stable profit margins.

### Limitations

- **Sparse Data in Some Regions:** *Low data density* may affect clustering accuracy.
- **External Factors Not Considered:** *Seasonality, competitor pricing, and local market conditions* were not included in the analysis.
- **Standard Deviation Pop:** Used to measure fluctuations but *does not indicate direct revenue impact* at a granular level.

### Recommendations

- **Reduce Discounts in High-Variability Areas:** *Cluster 2 requires discount adjustments* to avoid unstable profits & prevent margin losses.
- **Apply Best Practices from Cluster 3 & Adjust Pricing by Region:** *Moderate discounting strategies* from Cluster 3 should be applied in similar regions.
- **Custom regional pricing strategies** for high-discount, low-profit areas with high variability.
- **Leverage Predictive Analytics:** Implement *AI-driven pricing models & A/B testing*.
- **Further Research Needed:** Investigate *seasonality & competitor pricing impacts* to enhance future discount strategies. Cluster 3 may indicate effective pricing strategies.



When reviewing Profit Margin (%) for the business across the U.S. and Canada, the following should be considered:

### Cluster Breakdown (Profit Margin Variability)

- **Cluster 2:** High discounts → High volatility & low profitability.
- **Cluster 3:** Moderate discounts → Stable & high sales.
- **Clusters 0 & 1:** Lower discounts → More stable profit margins.
- **Circle size on the map indicates greater variability in profit margins.**

