

CREDIT CARD FRAUD DETECTION BY LOGISTIC REGRESSION

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Outline

- **Motivation**
- **Data Analysis**
- **Modelling**
- **Summary**
- **Recommendation**

Motivation

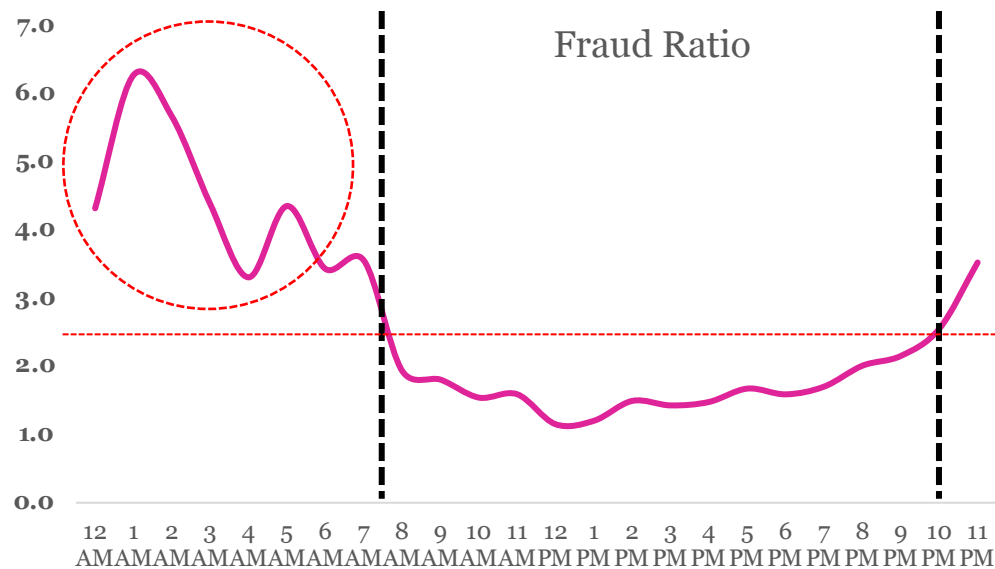
- Data categorization

Request	POS method	Location	Riskiness	Time	Card Present	
Excluding_Gas	Internet	International	Risky	Day-time	Present	
Electronics	Swipe	Others	Others	Midnight	Not Present	● ● ●
Automobile	Manual					
Jewel						
⋮						

Data Analysis

- **Significant variable**

Example. Fraud ratio across **24 hours**

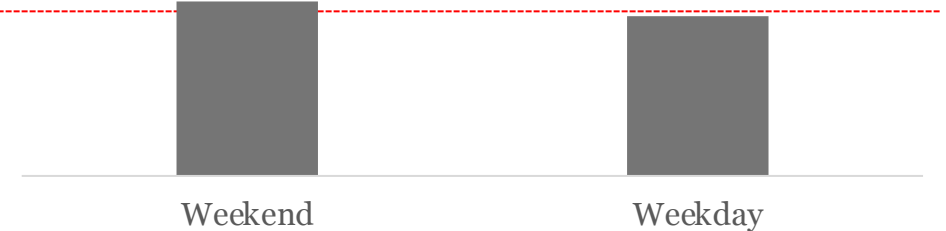


→ High odds during midnight than daytime

- **Non-significant variable**

Example. Fraud ratio on weekend vs weekday

Average
2.41%



→ Little difference

Modelling

- **Logistic Regression**

$$\log\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 x_{i,1} + \beta_2 x_{i,2} \quad \bullet \bullet \bullet$$

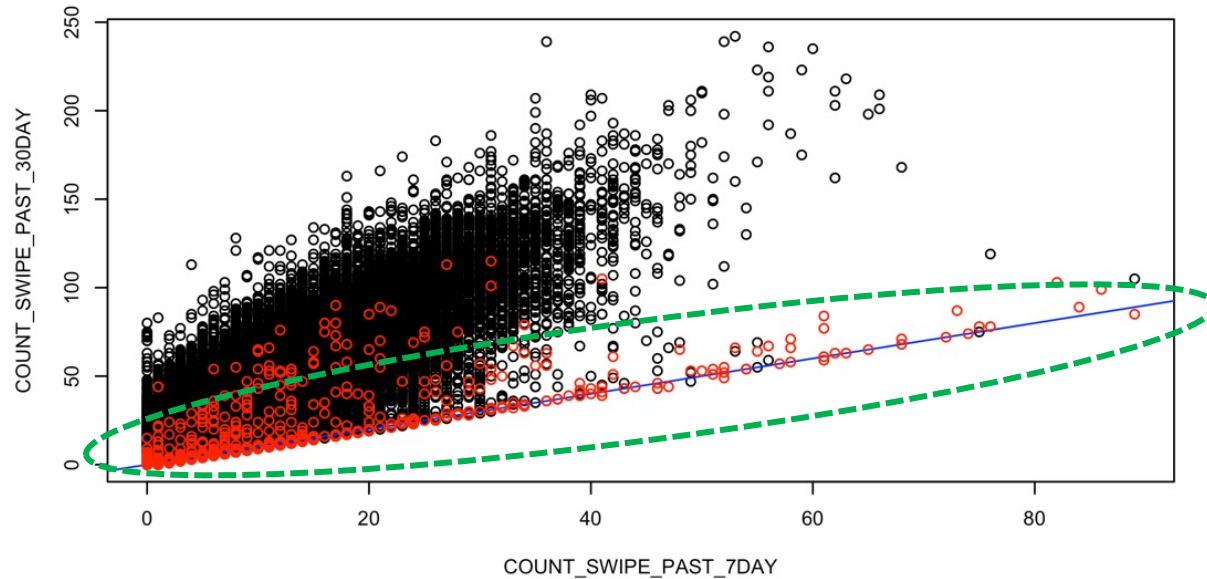
Set a model by excluding non-significant variable from dataset based on Odds Ratio

[Walds-based 95% Confidence Interval]

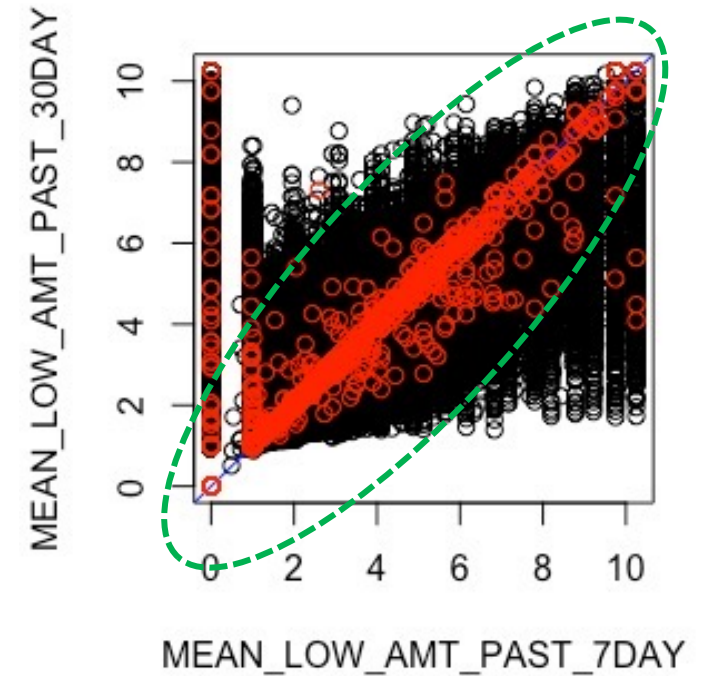
Variable	Lower bound	Estimate	Upper bound	
FLAG_Internet	4.767416	5.2040964	5.6807754	→ Significant
FLAG_Weekend	0.9960804	1.0969147	1.2079565	→ Non-significant

Modelling

- **Characteristic of Fraudulent Transaction**



○ Fraudulent transaction
○ Non-fraudulent transaction



Fraudulent transactions **tend to behave as normal** ones

based on information of past transaction (closer to a certain linear line)

Modelling

- **Summary**

of Variable : 92 from dataset

Probability threshold : 0.2272727

In test data,
534 transactions are considered fraudulent.

- **Transaction should be rejected...**

FLAG_Internet

+

FLAG_International

+

Credit_Limit

+

Card_Not_Present

Higher odds for
Fraudulent transaction

Balancing fraud prevention and business growth

- **E-commerce growth in credit card**

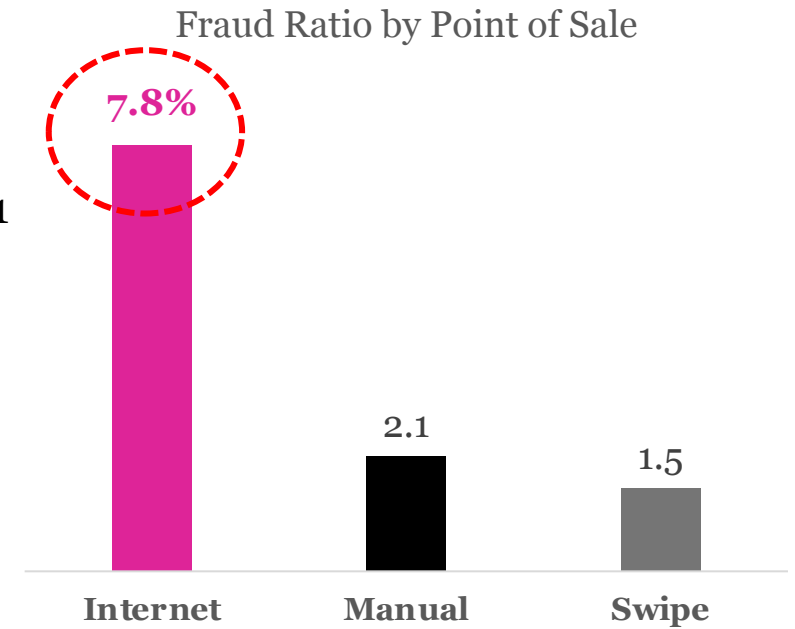
... but E-commerce has higher fraud ratio than others

- **Canadian Payment Methods Trends Report (2022)**¹

The value of e-commerce sales in 2021 were **double that in 2020** for the first three months of the year...

30% of Canadians agree that they noticed **an increase in fraudulent, cyber criminal or suspicious activity...**

41% of Canadians are **less comfortable with sharing their personal information with e-commerce...**



→ **Detecting fraudulent transaction in E-commerce is the most crucial**

1. https://payments.ca/sites/default/files/PaymentsCanada_Canadian_Payment_Methods_and_Trends_Report_2022_En_0.pdf

Process of fraud detection model affects customer's satisfaction

- **Makinsey & Company (2022)**²

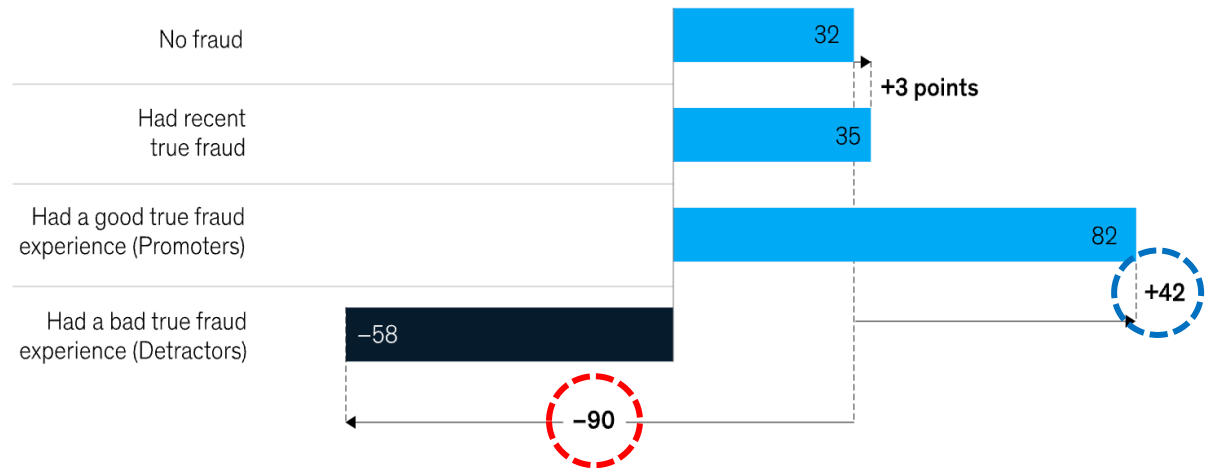
The impact in individual cases depends on **how companies handle the fraud issue** with customers' satisfaction from high to low...

tighter fraud and customer protection controls often add friction to the customer's experience...

Companies need to take actions across the **fraud value chain**... establishing an **appropriate fraud strategy** and paying attention to **customer experience**

When companies respond well to fraud events, customers report higher levels of satisfaction.

Average customer satisfaction score for different customer groups, illustrative



→ Need to build trust via not only detection model but also strategy dealing after detection frauds

2. <https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/a-new-approach-to-fighting-fraud-while-enhancing-customer-experience>

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Thanks for attention!