

Impact of Weather on Retail Sales in Canada: Clothing and Footwear Industry

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1. Objective

Determine the impact of weather on consumer behavior and retail sales

2. Why?

- ▶ Physiological
- ▶ Psychological

3. Methodology

- ▶ **Dependent Variable:**

- ▶ Monthly Retail Sales for the Clothing and Footwear Industry by QC, ON, and BC

- ▶ **Independent Variables:**

- ▶ Total Snow
 - ▶ Mean Temperature
 - ▶ Total Rain
 - ▶ Wind Speed

- ▶ **Control Variables:**

- ▶ CPI
 - ▶ Unemployment Rate
 - ▶ Disposable Income
 - ▶ Consumer Confidence

a) Correlation Matrix

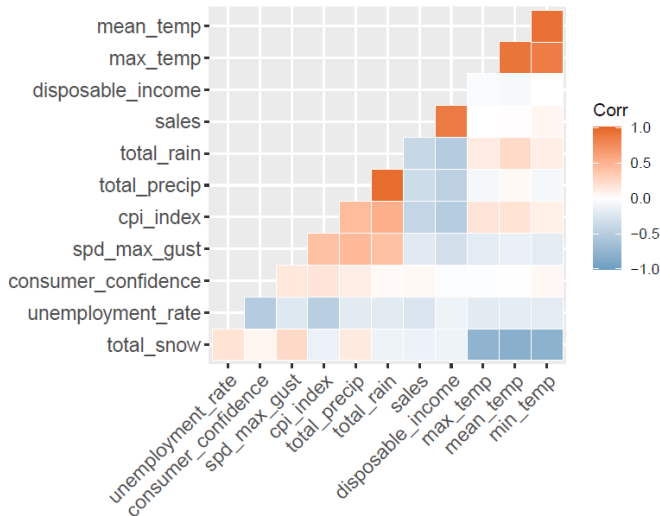


Figure 2: Correlation Heatmap

b) Distribution Analysis

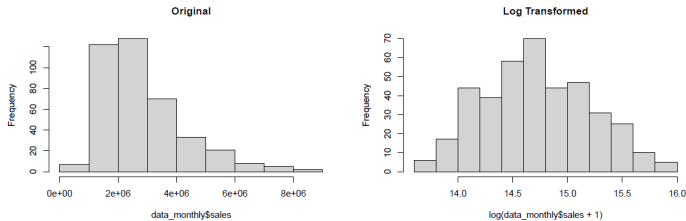


Figure 1: Histogram of Retail Sale

c) Multivariate Analysis

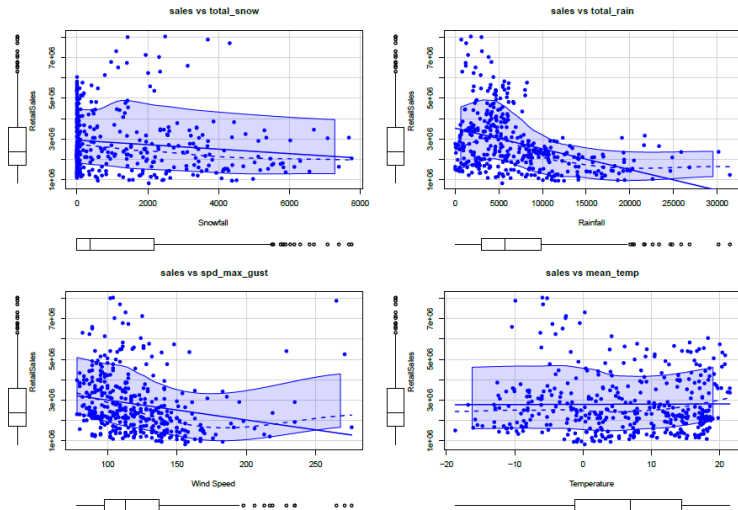


Figure 4: Scatterplots of Sales vs Weather

a) Result

Table 3: Regression Table

| | <i>Dependent variable:</i> | | | |
|--------------------------------|----------------------------|-------------------|-------------------|-------------------|
| | sales | | | |
| | (1) | (2) | (3) | (4) |
| consumer_confidence | 0.095*** (0.019) | | | |
| cpi_index | | -0.159*** (0.024) | | |
| disposable_income | | | 0.424*** (0.010) | |
| unemployment_rate | | | | -0.146*** (0.019) |
| total_snow | -0.191*** (0.044) | -0.196*** (0.043) | -0.044** (0.020) | -0.155*** (0.043) |
| total_rain | -0.225*** (0.030) | -0.200*** (0.030) | -0.015 (0.015) | -0.228*** (0.029) |
| mean_temp | -0.051 (0.037) | -0.038 (0.036) | 0.045*** (0.017) | -0.055 (0.036) |
| spd_max_gust | -0.105*** (0.030) | -0.014 (0.031) | -0.015 (0.014) | -0.133*** (0.029) |
| winter | 0.693*** (0.125) | 0.613*** (0.123) | 0.500*** (0.056) | 0.572*** (0.121) |
| I(mean_temp^2) | -0.044* (0.024) | -0.084*** (0.025) | -0.049*** (0.011) | -0.025 (0.024) |
| total_rain:winter | 0.062 (0.067) | 0.073 (0.066) | -0.034 (0.030) | 0.048 (0.065) |
| total_snow:winter | 0.030 (0.105) | 0.043 (0.103) | 0.087* (0.047) | 0.051 (0.101) |
| spd_max_gust:winter | -0.098 (0.095) | -0.068 (0.093) | 0.002 (0.043) | -0.053 (0.091) |
| Constant | 14.692*** (0.031) | 14.744*** (0.032) | 14.722*** (0.014) | 14.679*** (0.030) |
| Observations | 396 | 396 | 396 | 396 |
| R ² | 0.441 | 0.465 | 0.887 | 0.482 |
| Adjusted R ² | 0.426 | 0.451 | 0.884 | 0.468 |
| Residual Std. Error (df = 385) | 0.369 | 0.361 | 0.166 | 0.355 |
| F Statistic (df = 10; 385) | 30.340*** | 33.416*** | 302.359*** | 35.791*** |

Note:

*p<0.1; **p<0.05; ***p<0.01

b) Validation

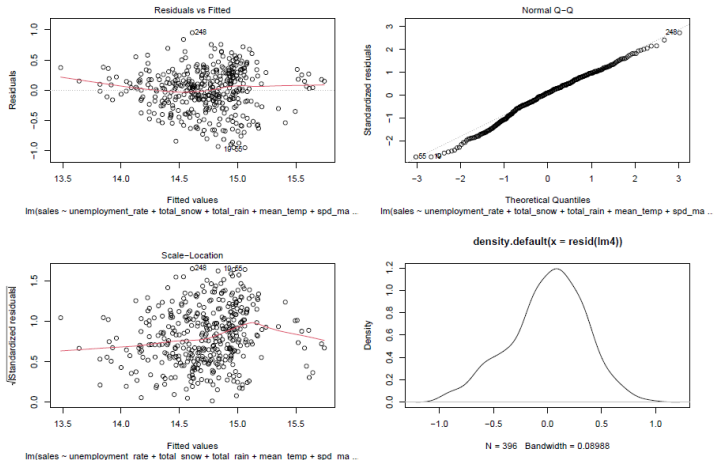


Figure 5: Model Validation

6. Conclusion

- ▶ H1: Retail Sales decreases with rainfall ✓
- ▶ H2: Retail Sales decreases with snowfall ✓
- ▶ H3: Retail Sales decreases with wind speed ✓
- ▶ H4: Retail Sales is negatively related to mean temperature X