

# Consumer Price Index (CPI) Canada Analysis Report

## Introduction

The Consumer Price Index (CPI) measures changes in the prices of goods and services purchased by Canadian consumers over time. This project analyzes CPI data from January to November to uncover seasonal price patterns, identify short-term price traps, and measure the real impact of inflation on affordability.

Using **Python**, **SQL**, and **Power BI**, the study provides practical insights for shoppers and policymakers showing when to buy, when to avoid, and how inflation affects purchasing power.

## Objectives

1. **Seasonality — Best Month to Buy:** Find months when products are cheapest or most expensive and create a buying calendar.
2. **Trap Index — Discount Rebound:** Detect short-lived discounts that quickly rebound to higher prices.
3. **Paycheck Pain — Hours Needed to Afford Food:** Convert inflation into work hours needed at the average Nova Scotia wage.
4. **Data Integration:** Use SQL for structured storage and Power BI for visualization.

## Methodology

### 1. Data Preparation and Cleaning (Python)

- The CPI dataset was imported and cleaned using pandas in Python.
- Columns such as REF\_DATE, Products and product groups, and VALUE were renamed and formatted for consistency.
- The REF\_DATE column was converted to a datetime format, and separate month and year fields were extracted.
- Missing values and unnecessary metadata columns were removed to ensure data accuracy.
- The cleaned dataset was exported for further analysis.

### 2. Analytical Computations (Python)

#### Seasonality — Best Month to Buy

A new dataset was generated named: cpi\_seasonality.csv

#### The Dataset Columns & Their Meanings

Column	Meaning
Product	Food category
Month_Cheapest	Cheapest month number
avg_value_Cheapest	CPI value in that month
Month_Expensive	Most expensive month

## Interpretation

- A **low CPI value** in a month = product is cheaper than usual.
- A **high CPI value** = product is expensive or inflated that month.
- By comparing across months, you can see seasonal trends — for example:
  - **Fresh fruits** may be cheapest in August (harvest season).
  - **Gasoline** might peak in July (travel season).

## Trap Index — Discount

**Goal:** Detect fake discounts — where prices dip briefly and then jump right back up, tricking consumers into thinking it's a deal.

A new dataset was generated named: **cpi\_trap\_index**

## Columns & Their Meanings

Column	Meaning
<b>Product</b>	The product whose prices show a “trap” pattern.
<b>Dip_Month</b>	The month when the price dropped (discount period).
<b>Rebound_Month</b>	The month when the price rose again sharply (after the dip).
<b>Dip_Pct</b>	The percentage drop in price during the dip (negative value).
<b>Rebound_Pct</b>	The percentage increase afterward (positive value).

## Interpretation

In your result:

- **Gasoline** dropped 4.4% in December, but rebounded 4% by February.
- That means the December “discount” wasn’t a real long-term deal — prices bounced back almost immediately.

## Insight Example:

Gasoline shows a Trap Index pattern — prices dip in December but rebound by February, suggesting that late-year discounts don't last long.

## Paycheck Pain — Hours Needed to Afford Food

**Goal:** Translate inflation into something people feel — the number of hours of work required to afford each item, based on the average wage.

A new dataset was generated named: `cpi_paycheck_pain`

### Columns & Their Meanings

Column	Meaning
<b>Product</b>	The CPI product or food category.
<b>REF_DATE</b>	The month of observation.
<b>VALUE</b>	The official CPI value (base price index).
<b>price_proxy</b>	A standardized measure (100 = baseline price at January). Anything above 100 means it's more expensive relative to baseline.
<b>hours_needed</b>	The hours of work needed at the average Nova Scotia wage to afford the item — shows affordability.

### Interpretation

- In January, 3.35 hours were needed.
- By May, 3.42 hours were needed.  
It's taking more work time to buy the same item — inflation has eroded purchasing power slightly.

## 3. SQL Analysis (SQL)

After processing the CPI dataset with Python, the cleaned data was stored and analyzed using SQL. SQL was used to organize the results, run queries, and extract insights on price seasonality, price traps, and affordability patterns.

Three main tables were created:

- **Seasonality Summary:** Shows the cheapest and most expensive months for each product.
- **Trap Index:** Detects short-term price drops and rebounds.
- **Paycheck Pain:** Measures the number of work hours needed to afford each product.

Using SQL queries, trends such as the cheapest purchasing months, fake discount periods, and affordability changes over time were identified. This helped reveal that some products experience predictable seasonal price shifts, while others show temporary “traps” where prices drop and rise again quickly.

SQL made it easy to summarize, compare, and link results across different datasets, forming the foundation for Power BI visualizations.

## 4. Power BI Report — CPI Canada 2025: Price Trends & Affordability

This Power BI dashboard visualizes the Canadian Consumer Price Index (CPI) for 2025, focusing on seasonal price behavior, temporary price traps, and affordability trends. It combines Python-generated insights and SQL-based data structuring into a clean, interactive interface to support both consumers and policymakers.

### Dashboard Objectives

1. **Seasonality — Best Month to Buy:**  
Identify when specific food and product items are cheapest or most expensive.  
Helps consumers make better purchase decisions.
2. **Trap Index — Discount Rebound:**  
Detect short-term price dips that rebound quickly, signaling potential fake discount periods.
3. **Paycheck Pain — Hours Needed to Afford Essentials:**  
Translate inflation impact into the number of working hours required at the average wage, showing real purchasing power trends.

### Conclusion:

The CPI analysis shows predictable seasonal price patterns, temporary “trap” discounts, and a gradual increase in the work hours needed to afford essentials, indicating that inflation is slightly eroding purchasing power.

### Recommendations:

- **Consumers:** Buy according to seasonal trends and avoid short-term “trap” discounts.
- **Policymakers/Retailers:** Improve pricing transparency and consider support for essentials affected by inflation.
- **Analysts/Businesses:** Monitor CPI trends regularly using Python, SQL, and Power BI to inform decisions.