Sandwich Ingredient Prices Among Seven Canadian Grocers: Metro Has the Highest Prices*

Sarah Ding

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1 Introduction

In this paper, we analyze the cost of making a standard sandwich at various grocery stores to determine which grocer offers the most affordable option. By examining the prices of essential sandwich ingredients—bread, ham, lettuce, and tomatoes—across multiple retailers, we aim to uncover pricing patterns that reflect each store's pricing strategy and competitiveness in offering staple food items.

The estimand in this study is the average cost of a sandwich based on consistent ingredient quantities, as well as price variations across different grocers. This represents the extent to which price differences in staple ingredients influence consumer choice and access to affordable food options.

Our results indicate that certain grocers, such as No Frills and Loblaws, offer lower average sandwich costs, while others, like Metro, are significantly more expensive. These findings suggest that grocers may adopt different pricing approaches on staple items.

Understanding the cost structure of essential food items helps reveal how grocery stores price basic meals and maintain affordability for consumers. Insights from this analysis could inform consumer choices, retailer pricing strategies, and policy discussions around food affordability, ultimately benefiting both shoppers and the grocery sector.

*Code and data are available at: [https://github.com/sarahdingg/Grocery_Prices.git).

The remainder of this paper is structured as follows. Section 2 describes the data and methodology used for analysis. Section 3 presents the data analysis results, and finally, Section 4 discusses limitations related to correlation, missing data, and potential sources of bias.

2 Data

2.1 Overview

The data was obtained as a SQLite file from Project Hammer (Filipp 2024) and cleaned using programming language SQL (ISO/IEC 2023) in DB browser (SQLite Development Team 2024). The paper is completed using programming language R (R Core Team 2023) to analyze and visualize the data.

2.2 Measurement

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2.3 Outcome variables

In the current analysis, the outcome variable is **'price per sandwich'**, it represents the total cost of a standard sandwich at each grocer based on the prices of the ingredients (bread, ham, lettuce, and tomatoes).

Table 1: Price per sandwich at various grocers, calculated by summing the average cost of each ingredient (bread, ham, lettuce, tomatoes) based on standardized quantities.

Vendor	price_per_sandwich
Loblaws	3.390352
Metro	13.911874
NoFrills	2.955802
SaveOnFoods	3.479458
TandT	3.720894
Voila	4.131907
Walmart	3.479969

The outcome variable in this analysis is the **price per sandwich** for each grocer, which represents the total cost of purchasing the ingredients necessary to make a standard sandwich. This variable was calculated by summing the average costs of essential sandwich components—bread, ham, lettuce, and tomatoes—based on consistent quantities required for one sandwich.

As shown in Table 1, there are noticeable differences in sandwich prices across grocers, indicating variation in pricing strategies for staple items. Grocers like No Frills and Loblaws offer more affordable options, while others, such as Metro, have higher costs. This variation in sandwich price per grocer provides insight into each store's approach to pricing staple foods, which can influence consumer shopping decisions.

2.4 Predictor variables

The predictor variables are: - **'Grocer'**: This categorical variable represents the different grocery stores (e.g., No Frills, Loblaws, Metro) and allows for comparison of sandwich costs across grocers. - **'Ingredient Price'**: The individual prices of each ingredient (bread, ham, lettuce, tomatoes) at each grocer. These prices are used to calculate the total sandwich cost. - **'Units'**: The packaging size or weight (e.g., 200g, 1kg) of each ingredient, as it affects the cost calculation based on required quantities for the sandwich.

Table 2: Average cost of individual sandwich ingredients (bread, ham, lettuce, tomatoes) at each grocer.

Grocer	Bread (avg cost)	Ham (avg cost)	Lettuce (avg cost)	Tomatoes (avg cost)
Loblaws	1.923035	0.7929376	0.3750099	0.2993694
Metro	1.774801	2.2528861	9.6294847	0.2547021
NoFrills	1.402393	0.5106608	0.5317737	0.5109745
SaveOnFoods	1.953802	0.5526742	0.6715044	0.3014771
TandT	2.186679	0.7445553	0.2616083	0.5280517
Voila	1.939593	1.0546746	0.5030288	0.6346103
Walmart	1.941035	0.8462068	0.3576721	0.3350543

Table 2 presents the predictor variables used in this analysis, specifically the average cost of each key sandwich ingredient—bread, ham, lettuce, and tomatoes—at each grocer. Each column represents one of these ingredients, showing the average price offered by each grocer. These prices provide information about the cost structure of individual items, which, when combined, contribute to the overall price per sandwich at each store. By examining the average cost of each ingredient across grocers, we can identify variations in pricing strategies. This breakdown highlights the individual contributions of each ingredient to the final sandwich cost, allowing us to better understand how each grocer positions itself in terms of affordability and value on staple items.

3 Results

This section presents findings on the average cost of making a sandwich at each grocers in Canada, visualizations are utilized to aid better understanding of findings.

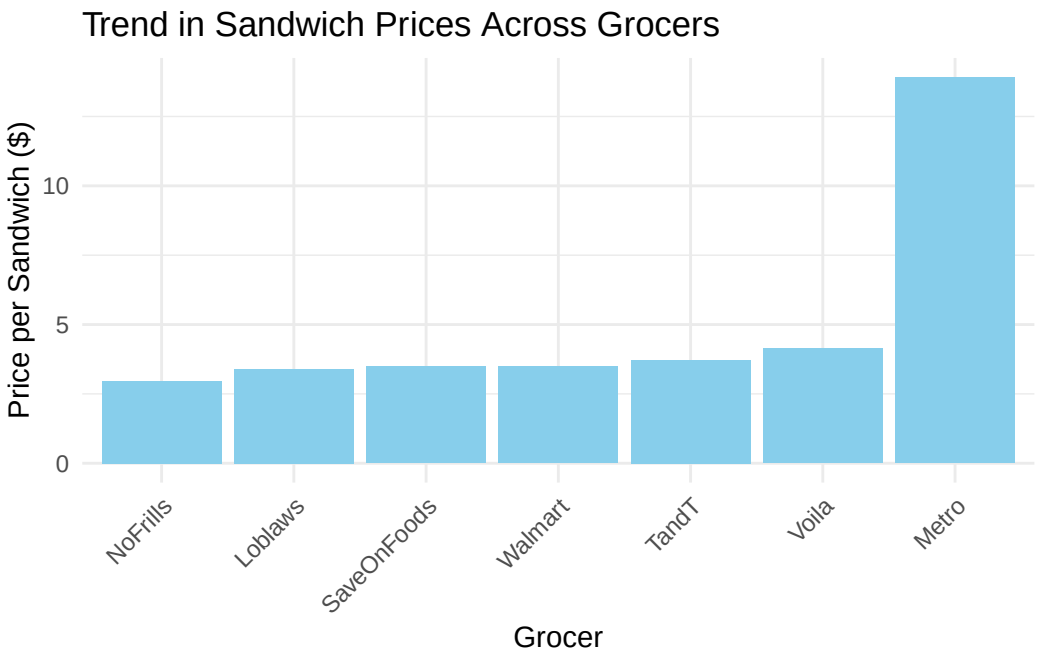

Figure 1: Bar graph illustrating the price of making a standard sandwich across different grocers. Each bar represents the total cost of sandwich ingredients—bread, ham, lettuce, and tomatoes—at a specific grocer, sorted by increasing price.

Figure 1 visualizes Table 1, it displays the variation in sandwich prices across grocers, revealing distinct differences in affordability. No Frills offers the lowest price per sandwich, indicating a focus on budget-friendly pricing for staple ingredients. Grocers like Loblaws, SaveOnFoods, and Walmart follow closely, with relatively moderate sandwich prices. In contrast, Metro's sandwich cost is significantly higher, reflecting a pricing strategy that may cater to a more premium market or higher operational costs. The graph emphasizes how grocers differ in their approach to pricing essential food items, with No Frills and similar stores positioned as cost-effective options for consumers. This trend suggests that pricing strategies and market positioning play a critical role in shaping consumer choices across grocery stores.

4 Discussion

4.1 Correlation vs. Causation

In this analysis, it is essential to distinguish between correlation and causation when interpreting the relationship between grocers and sandwich prices. The observed differences in sandwich prices across grocers demonstrate a correlation—certain stores consistently have higher or lower costs for the ingredients needed to make a sandwich. However, this does not imply that being associated with a specific grocer directly causes higher or lower prices. Other underlying factors, such as supply chain efficiencies, market positioning, regional cost variations, and vendor-specific strategies, likely influence ingredient pricing. For example, Metro's higher sandwich cost could correlate with a premium branding strategy, but this does not necessarily mean that Metro's branding alone causes the price difference. Establishing causation would require deeper investigation into these factors, beyond the pricing patterns analyzed in this study. Recognizing this distinction helps maintain an objective interpretation of the findings and avoids overgeneralization.

4.2 Missing Data

Missing data can significantly impact the results and interpretations of this analysis. In the context of this study, any missing values in ingredient prices could lead to an underestimation or misrepresentation of the sandwich cost for certain grocers. For example, if a grocer does not provide pricing data for one of the ingredients, the calculated sandwich price for that grocer might inaccurately appear lower than it truly is. Additionally, missing data could introduce bias if the absence of data is not random but instead reflects systematic differences, such as certain grocers not reporting prices for specific products or categories. To address this, the analysis excluded entries with missing data, ensuring that only complete data were used to calculate sandwich costs. While this approach maintains the integrity of the calculations, it may limit the comprehensiveness of the analysis by excluding certain grocers or ingredients. Future studies could address missing data more comprehensively through imputation methods or by exploring why specific data points are unavailable.

4.3 Sources of Bias

Several sources of bias could influence the findings of this analysis on sandwich prices across grocers. **Selection bias** is a key concern, as the study is limited to a specific set of grocers, which may not represent all stores or regions. For instance, smaller, independent grocery stores or discount retailers not included in the analysis might offer different pricing patterns that could impact overall affordability insights. **Temporal bias** could also arise if the price data collected reflects only a short time frame or specific seasons, leading to potential misrepresentation of average prices if certain ingredients are seasonally affected. **Product variation**

bias is another factor, as different grocers may stock variations of the same ingredient (e.g., organic or premium versions) that could be priced higher than standard options. This could skew average costs upward for some grocers, particularly those catering to higher-income markets. Addressing these biases in future research, perhaps by broadening the sample of grocers, including a longer time frame, and standardizing ingredient types, would provide a more comprehensive understanding of grocery pricing for essential items.

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