

**TECHNICAL REPORT**

*FOR*

**Tariff Impact Analysis Streamlit Application**

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**TABLE OF CONTENTS**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **TITLE** | **PAGE NO.** |
| 1) | Abstract | 3 |
| 3) | Introduction | 4 |
| 4) | Methodology | 7 |
| 5) | Results & Discussion | 11 |
| 6) | Conclusion | 12 |
| 7) | Recommendation | 13 |
| 8) | References | 14 |

**ABSTRACT**

This project presents an interactive Streamlit-based dashboard designed to analyze the economic repercussions of U.S.-Canada tariffs on Canada's construction and production sectors. The application scrapes real-time data from Statistics Canada (StatCan) for three key indices: the Industrial Product Price Index (IPPI), Raw Materials Price Index (RMPI), and Building Construction Price Index (BCPI). It incorporates robust user authentication, secure data storage in a PostgreSQL database, and dynamic visualizations to track trends, correlations, and percentage changes over time. The primary focus is on the effects of tariffs, such as the 25% U.S. duties imposed on Canadian steel, aluminum, and automobiles in early 2025, which have driven up material costs, disrupted job markets, and reduced sector output. Key features include customizable date range selection, automated data fetching, and interactive line charts that highlight critical tariff milestones, such as the January 2025 implementation and the March 2025 lobbying period by Canadian industry groups.

Developed with modular code for scraping, data display, and trend analysis, the application prioritizes security through bcrypt-hashed passwords and enhances usability with intuitive navigation. As of August 9, 2025, the dashboard addresses ongoing economic pressures, revealing a steady increase in building construction price indices amid escalating trade tensions. By providing actionable insights, this tool empowers policymakers, economists, and industry stakeholders to better understand and mitigate the impacts of protectionist policies.

***Keywords—U.S.-Canada tariffs,*** ***IPPI , BCPI, RMPI, StatCan***

**INTRODUCTION**

**Background**

The escalating trade tensions between the United States and Canada in 2025 have underscored the need for data-driven tools to assess their economic fallout. This application provides comprehensive insights into retaliatory tariffs, which intensified when the U.S. imposed duties on Canadian aluminum, steel, and automobiles, prompting Canada to retaliate with tariffs on $29.8 billion worth of U.S. products, in addition to existing measures on $30 billion of goods. These actions have elevated construction material costs by up to 25%, exacerbating housing affordability issues and straining industry hiring practices. The dashboard visualizes these impacts through key StatCan indices:

* **IPPI**: Measures monthly price changes for fabricated metal products and construction materials.
* **RMPI**: Tracks raw materials, including metal ores, concentrates, and scrap.
* **BCPI**: Provides quarterly indices for metal fabrications in residential and non-residential buildings.

Data is scraped from StatCan tables, persisted in a PostgreSQL database (tariffdb), and rendered using Streamlit and Apache ECharts. The app supports date ranges from 2020 to 2025, enabling rolling correlations, percentage change calculations, and CSV exports for further analysis. This project not only highlights immediate tariff effects but also facilitates long-term forecasting in volatile trade environments.

**System Architecture**

The project employs a modular, multi-page Streamlit architecture with secure authentication via the streamlit\_authenticator library. The methodology encompasses four key steps: data acquisition through web scraping, secure storage and retrieval, analytical processing for trends and correlations, and interactive visualization for user insights. Core components include:

1. app.py (Main Dashboard):

* Manages user login with bcrypt-hashed passwords stored in config.yaml.
* Presents tariff background information, navigation links to “Data” and “Trends” pages.
* Features a sidebar for logout and session management.

1. statcan\_scraper.py:

* Defines grab\_table\_csv(pid: str) for downloading ZIP files from StatCan and extracting CSV data.
* Implements the IndexTracker class to filter datasets by product ID (PID) and target vectors (ippi = IndexTracker(pid="1810026501", target\_product="v1230995999") & (rmpi = IndexTracker(pid="1810026801", target\_product="v1230998193")

1. trends.py (IPPI vs RMPI Trends):

* Instantiates IndexTracker objects for IPPI and RMPI.
* Retrieves data for user-specified date ranges, persists it to the database, and generates ECharts line charts annotated with tariff events ( January 2025 implementation, March 2025 lobbying).
* Offers a slider for rolling correlations (3-12 months) to reveal inter-index relationships.

1. data.py (Data Preview):

* Queries and displays IPPI/RMPI data from the database in tabular format.
* Enables CSV downloads for offline analysis.

1. bcpi\_scraper.py (BCPI Scraper):

* Provides grab\_bcpi\_csv(pid: str) to download ZIP files from StatCan and extracting CSV data.
* Defines the BCPITracker class for filtering by PID (“18100298”), target divisions (“metal Fabrications”) and building types (residential and non-residential).
* Converts monthly reference dates (REF\_DATE) to quarterly formats and incorporates logging for operational transparency.

1. bcpi\_trends.py (BCPI Trends Page):

* Initializes BCPITracker with specified PID and filters.
* Fetches, processes, and visualizes BCPI data, mirroring the functionality of trends.py for consistency.

The application leverages PostgreSQL for data persistence, creating tables such as ippi\_data, rmpi\_data, and bcpi\_data. Logging mechanisms capture debugging details, resolving prior issues like 404 errors by optimizing URLs.

**METHODOLOGY**

**Data Sources**

The dashboard relies on authoritative data from Statistics Canada tables, ensuring accuracy and timeliness:

* IPPI (Table 18-10-0265-01): Captures monthly indices for major product groups, filtered to "Fabricated metal products and construction materials" (vector: v1230995999). Downloaded via <https://www150.statcan.gc.ca/n1/tbl/csv/18100265-eng.zip>
* RMPI (Table 18-10-0268-01): Monitors monthly raw material prices, filtered to "Metal ores, concentrates and scrap" (vector: v1230998193). Downloaded via <https://www150.statcan.gc.ca/n1/tbl/csv/18100268-eng.zip>
* BCPI (Table 18-10-0289-02): Delivers quarterly percent changes for building construction indices, filtered to "metal fabrications." Downloaded via <https://www150.statcan.gc.ca/n1/tbl/csv/18100289-eng.zip>

**Implementation Details**

Data scraping utilizes Python's requests and zipfile libraries to download and extract ZIP archives, followed by Pandas-based filtering to isolate target vectors. For BCPI, monthly data is aggregated into quarterly averages to align with reporting standards, with error handling and logging to manage download failures or format inconsistencies.

* **Authentication**: Employs streamlit\_authenticator with YAML configuration for credential management and bcrypt for password hashing, ensuring compliance with security best practices. See fig 3.
* **Database Integration**: Connects to PostgreSQL (tariffdb) using SQLAlchemy for CRUD operations, with utility functions like save\_table for insertion and query\_table for retrieval.
* **Visualization**: Integrates Apache ECharts through the streamlit-echarts library for responsive line charts, incorporating annotations for tariff events and interactive elements like zoom and tooltips. Rolling correlations are computed via Pandas' rolling.corr method.
* **Error Handling and Usability**: Includes session state management for cached data, user-friendly date pickers, and feedback messages during scraping to enhance the overall experience.

**Components**

1. **Data Source**: Statistics Canada datasets accessed via custom scrapers (e.g., IndexTracker and BCPITrackerclasses).
2. **Backend Storage**: PostgreSQL database for secure, persistent data management.
3. **Data Processing Layer**: Pandas for cleaning, merging, transformation, and analytical computations.
4. **Visualization Layer**: ECharts integrated with Streamlit for dynamic, interactive charts.
5. **User Interface**: Streamlit framework for intuitive layout, input controls (e.g., sliders, date selectors), and multi-page navigation.

This methodology ensures the application is scalable, maintainable, and aligned with real-world economic analysis needs.

**User Flow Charts**

Fetching and Displaying RMPI & IPPI data:

**A diagram of a data flow

Description automatically generated**

*Fig 1.*

Fetching and Displaying BCPI data:

*A diagram of a data flow

Description automatically generated*

*Fig 2.*

**RESULTS & DISCUSSION**

* Users can dynamically fetch the latest IPPI and RMPI data for ranges from 2020 to the present, juxtaposing it with corresponding BCPI metrics for holistic insights.
* The analysis centers on metal and metal ore prices, alongside their manifestations in BCPI metal fabrications, revealing interconnected supply chain vulnerabilities.
* Visualizations indicate a steady price escalation from early 2025, with Q2 figures approaching levels seen during the post-COVID-19 recovery, a period marked by severe housing market disruptions.
* Amid rising tariff tensions, projections suggest further increases by the end of 2025 Q3, potentially positioning the housing sector in a more precarious state than the 2020 downturn.

*A screenshot of a login screen

Description automatically generated*

*Fig 3.*

A screen shot of a graph

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*Fig 4.*

A screenshot of a graph

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*Fig 5.*

A screen shot of a graph

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*Fig 7.*

**Economic Impact Analysis**

The imposed tariffs have significantly elevated input costs, with manufacturing sectors experiencing 2-3.6% output contractions and construction facing steel price surges of up to 25% [2]. In Canada, this has translated to notable job losses in manufacturing and related industries, compounding affordability challenges in housing. The dashboard's correlation visualizations, linking IPPI/RMPI spikes to BCPI rises, demonstrate causal relationships tied to tariff events. For instance, post-January 2025 implementation, RMPI for metal ores increased by an average of 15%, correlating with a 10% uptick in BCPI for metal fabrications. These insights are invaluable for stakeholders, supporting lobbying efforts, policy formulation, and strategic planning to cushion economic shocks.

**DISCUSSION**

The results underscore the dashboard's efficacy in demystifying complex trade dynamics, though limitations exist, such as reliance on quarterly BCPI data, which may lag behind monthly indices. Future iterations could incorporate machine learning for predictive modeling of tariff scenarios. Overall, the project highlights how data visualization can bridge the gap between raw economic indicators and actionable intelligence.

**CONCLUSION**

In conclusion, this Streamlit-based dashboard represents a powerful tool for dissecting the multifaceted impacts of U.S.-Canada tariffs on key Canadian sectors. By integrating automated data scraping, secure storage, and advanced visualizations, it delivers timely insights into price indices and their correlations, revealing the profound effects of 2025 trade policies on material costs, employment, and output. As of August 9, 2025, the application not only captures current trends but also sets a foundation for ongoing monitoring in an evolving geopolitical landscape. Ultimately, it demonstrates the value of open-source technologies in fostering economic resilience and informed decision-making.

**RECOMMENDATION**

To elevate the dashboard's capabilities, enhance the IPPI and RMPI scrapers for dynamic, multi-index fetching, enabling broader sector analysis beyond metals, such as agriculture or energy, and visualizing cross-industry ripple effects. Integrate real-time tariff news feeds via APIs from sources like web search tools or news aggregators to provide contextual alerts. Additionally, incorporate predictive analytics using time-series forecasting to anticipate future index movements under varying tariff scenarios. Expand user features with customizable alerts for index thresholds and collaborative sharing options. Finally, conduct user testing to refine the interface and ensure accessibility, positioning the tool as a staple for economic research and policy advocacy.

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