A Comparative Analysis of COVID-19 and the 2008 Financial Crisis: Evidence from the Canadian Economy

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This paper compares the dynamic effects of two major global shocks on the Canadian economy: the 2008 Global Financial Crisis (GFC) and the COVID-19 pandemic. Using Dynamic Time Warping (DTW) and 24 months of monthly data for each episode, the analysis examines similarities and differences in the adjustment paths of key indicators, including GDP, unemployment, trade flows, commodity prices, and exchange rates. The results show that although both crises produced broadly comparable trajectory shapes, their dynamics diverged in speed and intensity. The GFC exhibited a gradual and persistent downturn consistent with financial-demand and balance-sheet mechanisms, whereas COVID-19 generated an abrupt but short-lived contraction driven by supply constraints, mobility restrictions, and sector-specific disruptions. These findings suggest that the nature of the underlying shock plays a central role in shaping the pace and pattern of macroeconomic adjustment, and that Canada's responses across crises reflect both common adjustment mechanisms and shock-specific dynamics rather than identifiable policy effects.

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1 Introduction

The 2008 global financial crisis (GFC) and the COVID-19 pandemic represent two of the most severe macroeconomic shocks of the past two decades, each generating profound disruptions to global economic activity (Chen et al., 2019; Naseer et al., 2023). Although both episodes produced sharp contractions and heightened uncertainty, they originated from fundamentally different sources: the GFC was rooted in financial-system fragilities and balance-sheet deterioration, whereas COVID-19 emerged as a global health emergency that triggered widespread mobility restrictions and supply-chain disruptions. These distinct origins imply different transmission mechanisms, adjustment speeds, and recovery dynamics, making a comparative analysis both timely and analytically valuable.

The GFC was primarily a financial-demand shock, propagated through the collapse of housing markets, the deterioration of bank balance sheets, and the amplification effects of the financial accelerator (Gorton, 2009; Brunnermeier, 2009). As credit constraints tightened and asset prices fell, households and firms reduced spending, generating a broad-based decline in demand. Such mechanisms typically produce gradual downturns and slow recoveries, as deleveraging, impaired credit channels, and persistent uncertainty weigh on economic activity.

In contrast, COVID-19 generated a supply-constraint and mobility-restriction shock, characterized by mandatory lockdowns, sector-specific shutdowns, and disruptions to global production networks (Goolsbee & Syverson, 2021). These mechanisms created sharp but uneven contractions across sectors, with contact-intensive industries experiencing sudden collapses while others remained resilient or even expanded. The pandemic also induced labour-market frictions, labour hoarding, and rapid shifts in consumption patterns, contributing to highly asynchronous adjustment dynamics. Once restrictions eased, many sectors rebounded quickly, producing a recovery that was sharper but more volatile than that observed during the GFC.

Despite their differences, both crises prompted unprecedented policy interventions. Central banks implemented aggressive monetary easing, while governments deployed large-scale fiscal stimulus packages, though the composition and timing of these interventions differed markedly across episodes (Borio, 2020; Strauss-Kahn, 2020). Understanding how these policy responses

interacted with the underlying shock structures is essential for interpreting the observed macroeconomic trajectories.

While extensive research has examined each crisis individually (e.g., Naseer et al., 2023; Estrada et al., 2021), relatively little work directly compares their macroeconomic impacts within the Canadian context. Canada's economic structure—characterized by a large resource sector, high trade openness, and a distinct policy environment—makes it an informative case for studying how different types of shocks propagate through the economy. A comparative perspective can shed light on the resilience of key indicators, the role of policy interventions, and the extent to which crisis dynamics depend on the nature of the underlying shock.

This paper contributes to the literature by providing a comparative analysis of the macroeconomic adjustment paths following the GFC and COVID-19 in Canada. Using Dynamic Time Warping (DTW), we examine the shape and timing of movements in GDP, unemployment, commodity prices, and trade flows to assess whether the two crises generated similar or distinct dynamic patterns. By linking these trajectories to the theoretical mechanisms associated with financial-demand shocks and supply-constraint shocks, the analysis offers a more structured interpretation of crisis dynamics than descriptive comparisons alone.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on crisis transmission mechanisms and macroeconomic adjustment. Section 3 describes the data and analytical framework. Section 4 outlines the methodology. Section 5 presents and interprets the results. Section 6 concludes with key findings and implications for economic policy and future crisis preparedness.

2 Literature Review

Global crises such as the 2008 GFC and the COVID-19 pandemic were transmitted across borders through financial, trade, and uncertainty channels, generating widespread macroeconomic disruptions. The literature emphasizes that global financial conditions—particularly those originating in the United States—play a central role in shaping macroeconomic tail risks in other economies. Beutel et al. (2025), using Bayesian quantile VARs for 44 advanced and emerging economies, show that tightening U.S. financial conditions significantly increases downside growth

risks, especially in countries with high foreign-currency exposure or limited exchange-rate flexibility. Similarly, Wu et al. (2025) highlight the role of global trade uncertainty in amplifying supply-side disruptions and output losses during major crises.

A large body of research has examined the transmission mechanisms of the GFC. Theoretical work emphasizes the role of the financial accelerator (Bernanke, Gertler & Gilchrist, 1999), balance-sheet recessions (Kiyotaki & Moore, 1997), and household leverage cycles (Mian & Sufi, 2014) in propagating financial-demand shocks. Empirically, the GFC produced a sharp contraction in global trade and liquidity (Silva et al., 2023), with cross-country spillovers shaped by financial integration, trade linkages, and macroeconomic fundamentals (Jiang et al., 2022). Firm-level evidence also shows that export-dependent economies experienced deeper equity market declines (Silva et al., 2023), underscoring the importance of external exposure in crisis transmission.

The COVID-19 pandemic generated a different set of macroeconomic dynamics. Rather than originating in financial markets, the shock emerged from public-health restrictions, supply-chain disruptions, and mobility constraints. Recent theoretical work characterizes COVID-19 as a Keynesian supply shock (Guerrieri et al., 2022), in which supply constraints spill over into demand shortfalls. Empirical studies document sharp increases in uncertainty (Shen et al., 2025), heightened financial-market sensitivity to macroeconomic news (Bouzgarrou et al., 2023), and sector-specific disruptions in credit provision (Boubakri et al., 2023). Equity-market evidence from the Americas also shows that COVID-19 news significantly affected volatility, though markets gradually adapted to the persistence of the pandemic (Ayadi et al., 2025).

Comparative studies of the two crises remain limited. Li et al. (2021) compare the U.S. macroeconomic response across the GFC and COVID-19 and find that consumer spending, unemployment, and industrial production experienced more severe short-run declines during the pandemic. However, most comparative work focuses on the United States or global aggregates, leaving a gap in the literature on how these crises unfolded in Canada.

A growing Canadian literature provides important context for understanding how the GFC and COVID-19 unfolded domestically. Cross and Bergevin (2012) document the timing and characteristics of Canadian business cycles, including the GFC, highlighting the role of external shocks in driving domestic downturns. The review of GFC outlines how financial-market stress,

liquidity shortages, and collapsing global demand shaped Canada's recession and the policy measures adopted in response. For COVID-19, Lemieux et al. (2020) analyze the unprecedented labour-market adjustment, underscoring the importance of sectoral shutdowns, differential exposure across industries, and labour-hoarding behaviour. Brodeur et al. (2021) review the broader economic effects of the pandemic, including supply-chain disruptions, shifts in consumption patterns, and the scale of fiscal interventions. Collectively, these studies show that Canada's crisis dynamics reflect both global transmission mechanisms and domestic structural features, such as its commodity-exporting profile, labour-market institutions, and relatively resilient financial system.

Internationally, Canada's experience shares features with other advanced economies—such as the rapid labour-market collapse and rebound during COVID-19 (Chetty et al., 2020) and the gradual, credit-driven recovery after the GFC (Jordà, Schularick & Taylor, 2013)—but also differs due to its commodity dependence and policy environment. These comparisons highlight the importance of situating Canada's crisis responses within both domestic and global contexts.

Overall, the existing literature highlights that the GFC and COVID-19 represent fundamentally different types of shocks—financial-demand versus supply-constraint—and that their macroeconomic effects depend on financial structure, sectoral composition, and policy responses. However, few studies directly compare the dynamic adjustment paths of key Canadian indicators across the two crises. This paper contributes to filling this gap by using Dynamic Time Warping (DTW) to assess the similarity of macroeconomic trajectories across episodes and by interpreting these patterns through established macroeconomic mechanisms.

3 Comparative Approach and Data

3.1 Analysis Timeframe Reference

This study adopts a consistent 24-month timeframe to examine the similarity in the pattern and shape of macroeconomic indicator responses to the Global Financial Crisis (GFC) and the COVID-19 pandemic. This analytical window is designed to capture both the period of sharpest disruption and the initial phase of recovery, while deliberately excluding longer-term structural adjustments that extend beyond the immediate crisis dynamics.

The timing of the shock and early recovery phases aligns with established research. Studies of the Canadian GFC consistently identify late 2008 through mid-2009 as the period of acute financial stress (Cross & Bergevin 2012), while analyses of the COVID-19 recession document the major economic shock occurring in 2020 with recovery beginning in 2021 (Lemieux et al. 2020; Brodeur et al. 2021).

For the COVID-19 pandemic, the crisis shock and peak phase covers January to December 2020, corresponding to the onset of the pandemic, widespread lockdowns, supply-chain disruptions, and unprecedented declines in economic activity. This timing is consistent with documented accounts of the Canadian economic crisis emerging rapidly in March 2020, when the Bank of Canada intervened to stabilize a financial system "under extreme stress" (Chronology of the Economic Response to the COVID-19 Crisis, 2020). The early recovery phase, from January to December 2021, reflects the gradual reopening of economies, the rollout of vaccination programs, and the progressive normalization of economic conditions. Comparative studies describe the COVID-19 recession as the major downturn of 2020–21 (York University, 2020), supporting the use of this two-year window.

By aligning the analysis to identical 24-month periods for both crises, this framework facilitates a direct and balanced comparison of macroeconomic performance under two distinct global shocks. It highlights the evolution of key indicators during the most intense stages of disruption and the subsequent recovery, offering insights into the resilience and responsiveness of economic systems under stress. To ensure that the results are not driven by the specific window choice, we also conduct a series of robustness checks using alternative starting dates and longer time horizons. These additional DTW tests—reported in the Appendix—confirm that the qualitative conclusions remain stable across reasonable variations in sample definition.

Table 1: *Crisis Phases and Timeframes for GFC and COVID-19*

Phase	GFC	COVID-19
Crisis shock and peak	Aug 2008 – Jul 2009	Jan 2020 – Dec 2020
Early recovery	Aug 2009 – Jul 2010	Jan 2021 – Dec 2021

3.2 Data Description

This study uses monthly data for nine key macroeconomic indicators to compare the effects of the GFC and the COVID-19 pandemic on the Canadian economy. The data are drawn from various reputable sources, including Statistics Canada, the Bank of Canada, and the Federal Reserve Bank of St. Louis. Table 2 provides a description of each variable and its data source, while Table 3 presents the corresponding descriptive statistics.

Table 2: *Indicator Definition and Description*

Indicator	**Description**
GDP	Gross Domestic Product, monthly annualized estimates in chained 2017 Canadian dollars. Source: Statistics Canada, Table 36-10-0434-01.
CPI	Headline Consumer Price Index, monthly, not seasonally adjusted (Index = 100 for 2002). Source: Statistics Canada, Table 18-10-0004-01.
Unemployment	Unemployment rate, monthly, seasonally adjusted. Source: Statistics Canada, Table 14-10-0287-01.
Interest rate	Average monthly intermediate interest rate. Source: Federal Reserve Bank of St. Louis.
Retail trade	Total monthly retail sales, seasonally adjusted. Source: Statistics Canada, Table 20-10-0056-01.
Exports	Total monthly international merchandise exports in nominal Canadian dollars. Source: Statistics Canada, Table 12-10-0011-01.
Imports	Total monthly international merchandise imports in nominal Canadian dollars. Source: Statistics Canada, Table 12-10-0011-01.
Exchange rate	Average monthly U.S. dollar to Canadian dollar exchange rate. Source: Bank of Canada.
WTI	Average monthly price per barrel of West Texas Intermediate crude oil, in U.S. dollars. Source: Federal Reserve Bank of St. Louis.
BCPI	Bank of Canada Commodity Price Index: a monthly Fisher chain price index (in U.S. dollar) of 26 commodities produced in Canada and sold on world markets. Includes energy, minerals, forestry, agriculture, and fisheries. Source: Bank of Canada.

Table 3: *Descriptive Statistics*

Variable	*Details*	*M*	*SD*	*Min*	*Max*
GFC GDP	Trillion C$	1.67327E+12	2.80E+10	1.63533E+12	1.71471E+12
COVID GDP	Trillion $	2.0475E+12	9.99E+10	1.74791E+12	2.16506E+12
GFC CPI	2002=100	114.92	0.96	113.00	116.80
COVID CPI	2002=100	139.28	2.79	135.70	144.20
GFC Unemployment	%	0.0800	0.00836	0.0620	0.0880
COVID Unemployment	%	0.0861	0.0233	0.0550	0.1420
GFC FX	US$/C$	1.1122	0.0832	1.0052	1.2645
COVID FX	US$/C$	1.2975	0.0544	1.2125	1.4048
GFC Exports	Billion C$	3.28E+10	4.55E+09	2.75E+10	4.44E+10
COVID Exports	Billion C$	4.81E+10	6.54E+09	3.25E+10	5.89E+10
GFC Imports	Billion C$	3.25E+10	3.23E+09	2.82E+10	4.11E+10
COVID Imports	Billion C$	4.83E+10	5.43E+09	3.46E+10	5.65E+10
GFC WTI	C$	70.06	18.52	39.08	116.70
COVID WTI	C$	53.66	17.38	16.98	81.36
GFC IR	%	0.00830	0.00937	0.00239	0.0300
COVID IR	%	0.00365	0.00453	0.00160	0.0175
GFC Retail	Billion C$	3.53E+10	1.02E+09	3.33E+10	3.69E+10
COVID Retail	Billion C$	5.67E+10	5.65E+09	3.76E+10	6.24E+10
GFC BCPI	1972=100	511.10	87.92	381.79	748.85
COVID BCPI	1972-100	486.17	128.33	230.69	682.24

Notes: *M*: mean; *SD*: standard deviation; *Min*: minimum; *Max*: maximum

Table 3 presents key descriptive statistics for the GFC and COVID-19. The average unemployment rate remained relatively similar across both crises, but COVID-19 exhibited greater variability (standard deviation = 0.0233 vs. 0.0084), indicating more abrupt and short-lived labour market disruptions. Oil prices (WTI) and the overall commodity price index (BCPI) were markedly lower during COVID-19 compared to the GFC, suggesting subdued global demand and increased volatility in energy and commodity markets. Exchange rates were higher on average during COVID-19 (mean = 1.2975) than during the GFC (mean = 1.1122), with lower standard deviation (COVID-19 SD = 0.0544 vs. GFC SD = 0.0832), pointing to more stable currency movements. Overall, these patterns indicate that while output, prices, trade flows, and retail activity were more robust during COVID-19, resource prices lagged behind their GFC levels and displayed heightened volatility in several cases.

4 Methodology

This study employs the Dynamic Time Warping (DTW) technique to examine the similarity in the responses of macroeconomic indicators during two major crises. DTW is a non-parametric algorithm designed to analyze temporal alignment between time series (Raihan, 2017). While DTW has been widely applied in fields such as speech recognition, movement analysis, and data mining, its use in economic research remains relatively limited (Franses & Wiemann, 2020). This makes it a useful and underexplored tool for comparing macroeconomic adjustment patterns across crisis episodes.

DTW offers several advantages over traditional similarity metrics, such as Pearson's correlation coefficient, by allowing for dynamic timing differences, non-linear alignment between sequences, and robust handling of series with varying lengths or noisy data (Petitjean et al., 2010). Recent work in computational economics highlights that macroeconomic time series often exhibit asynchronous dynamics, phase shifts, and uneven speeds of adjustment—features that standard synchronous measures cannot adequately capture. DTW is specifically designed to align such non-synchronous patterns, making it well-suited for comparing crisis episodes where the timing and intensity of shocks differ substantially. As emphasized by Franses & Wiemann (2020), DTW provides a flexible framework for identifying similarities in the shape of economic trajectories, even when the underlying shocks unfold at different paces. This focus on trajectory similarity, rather than contemporaneous co-movement or level differences, allows DTW to offer a richer characterization of crisis dynamics than simple correlations or growth-rate comparisons.

A further advantage of DTW in this context is that it enables a descriptive comparison of crisis dynamics without imposing strong structural or causal assumptions. Because the objective of this paper is to assess whether macroeconomic indicators followed similar adjustment paths across two distinct crises, DTW provides a non-parametric tool that captures trajectory similarity without requiring a specific econometric model. This makes DTW a useful complement to traditional approaches such as correlations, growth-rate comparisons, or VAR-based impulse responses. While those methods focus on contemporaneous co-movement or estimated causal effects, DTW focuses on the shape and timing of adjustment, which is particularly relevant when crises differ in speed, duration, and underlying shock structure. In this sense, DTW is not a

substitute for structural analysis but a descriptive tool that helps reveal whether the two episodes exhibit comparable dynamic patterns.

Although DTW produces a well-defined distance measure, it does not have a known sampling distribution, and its statistical properties depend heavily on the temporal structure of the underlying series. Because the crisis windows examined in this study are short and represent unique macroeconomic events rather than repeated samples, resampling-based procedures such as bootstrapping would not yield meaningful inference. Resampling would break the temporal dependence and shock-propagation patterns that DTW is designed to capture, and the resulting distribution of distances would not correspond to any interpretable null hypothesis. For this reason, DTW distances are used here as descriptive measures of trajectory similarity rather than as inputs to formal hypothesis testing. The focus of the analysis is on comparing the relative shape and timing of adjustment paths across crises, consistent with the non-parametric and descriptive nature of the DTW framework.

The DTW algorithm operates by constructing a distance matrix that quantifies pairwise distances between each point in the two time series under comparison. Using a dynamic programming approach, DTW identifies an optimal warping path that minimizes the cumulative distance by enabling flexible temporal alignment. This warping path effectively "stretches" or "compresses" the time axis to accommodate potential shifts or non-linear variations in the timing of patterns between the series. Consequently, DTW provides a robust similarity measure that captures temporal distortions often missed by traditional linear measures such as correlation coefficients. The minimal cumulative distance produced by the algorithm quantifies the overall dissimilarity between the series, with smaller values indicating greater similarity in their temporal dynamics. This method is particularly well-suited for analyzing economic indicators during crisis periods, where timing differences in responses are common (Raihan, 2017).

DTW can be illustrated by depicting a relationship between two time sequences as the following (Müller, 2007):

$$X = (x_1, x_2, \dots, x_n) \tag{1}$$

$$Y = (y_1, y_2, \dots, y_n) \tag{2}$$

The goal of DTW is to find an algorithm path $\pi = ((x_1, y_2, \dots, (x_L, y_L))$ that minimizes the cumulative distance between matched points, subject to monotonicity and continuity constraints:

$$DTW\ (X,Y) = min_{\pi} \sum_{(i,j)\epsilon\pi}^{n} d(x_i, y_i) \tag{3}$$

where $d(x_i, y_i)$ is Euclidean distance.

Computationally, DTW is implemented via dynamic programming. A distance matrix D is constructed, where:

$$D_{i,j} = d(x_i, y_i), 1 \le i \le N, 1 \le j \le M \tag{4}$$

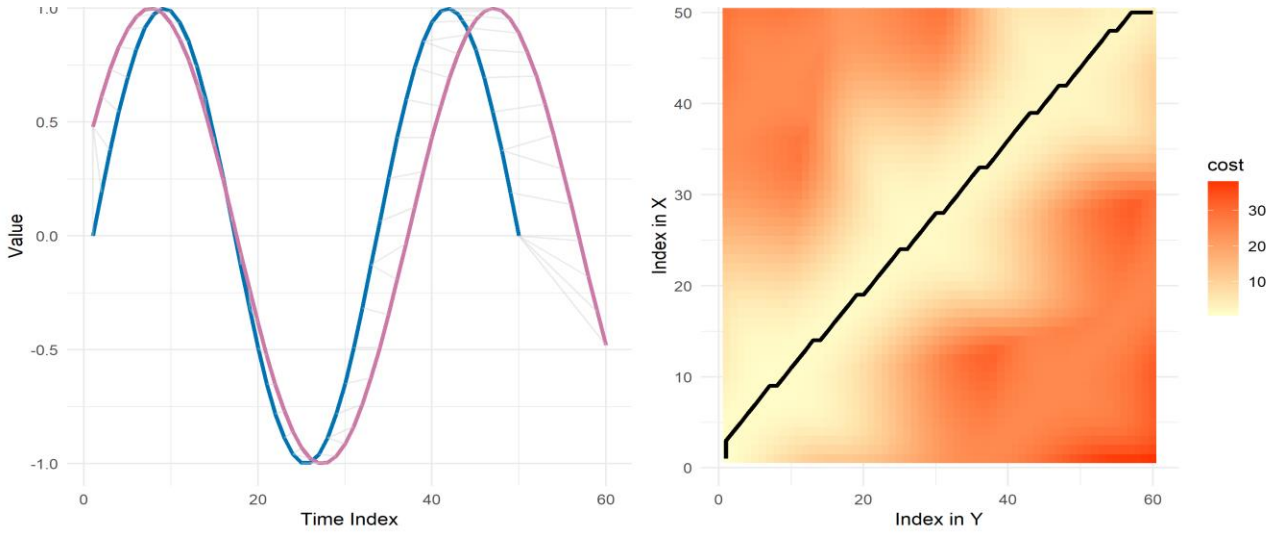
A cumulative cost matrix C is then computed recursively:

$$C_{i,j} = D_{i,j} + min \begin{cases} C_{i-1,j,} \\ C_{i,j-1,} \\ C_{i-1,j-1} \end{cases} \tag{5}$$

with $C_{1,1} = D_{1,1}$ and appropriate boundary initialization. The minimal cumulative cost $C_{N,M}$ quantifies dissimilarity, with smaller values indicating greater similarity in temporal dynamics. This flexibility makes DTW well-suited for economic indicators during crises, where variables may display similar patterns but with shifted timing.

Figure 1 presents a visual representation of the DTW time series alignment along with its accumulated cost matrix.

Figure 1*: Visual Representation of DTW Time Series Alignment and Accumulated Cost Matrix*

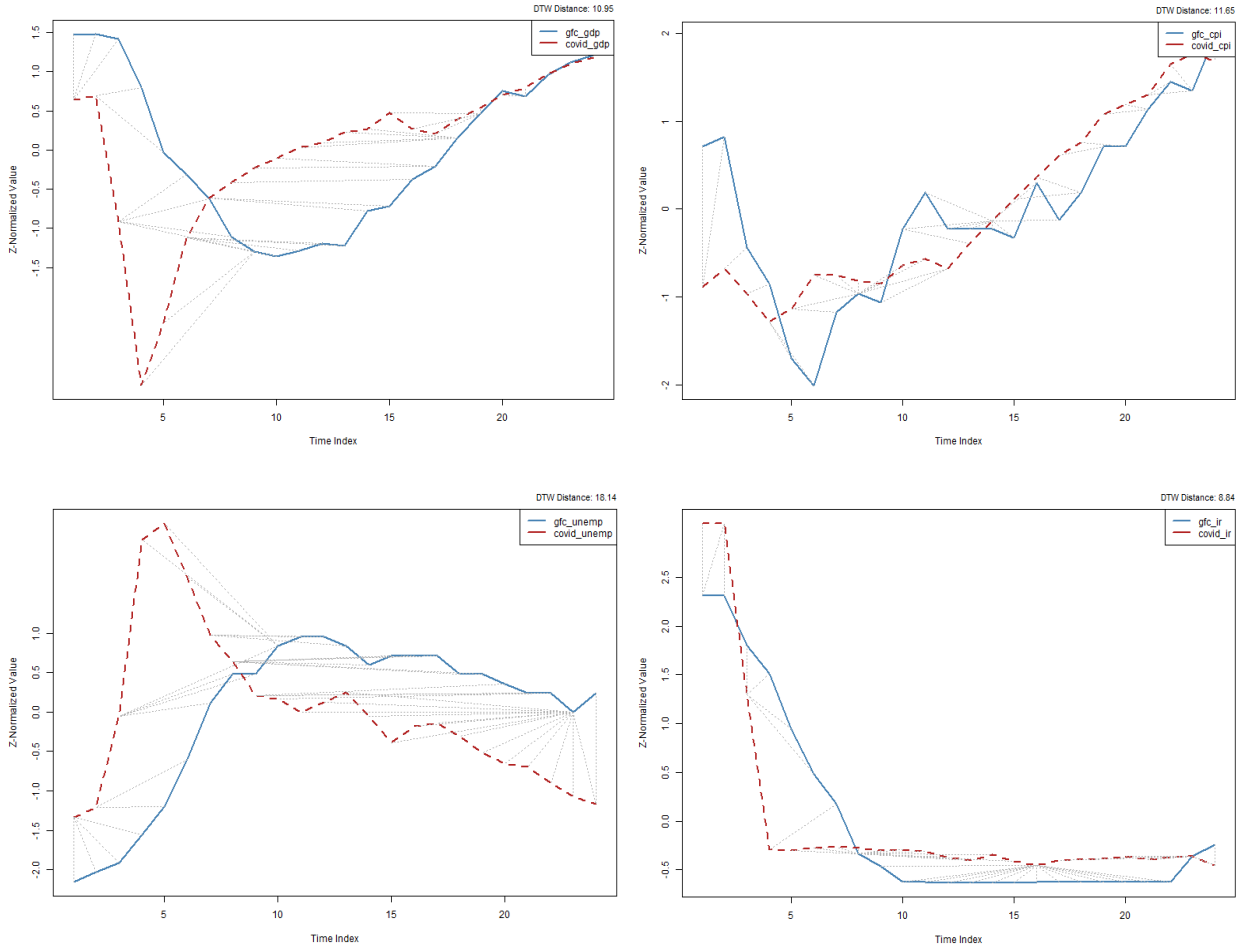


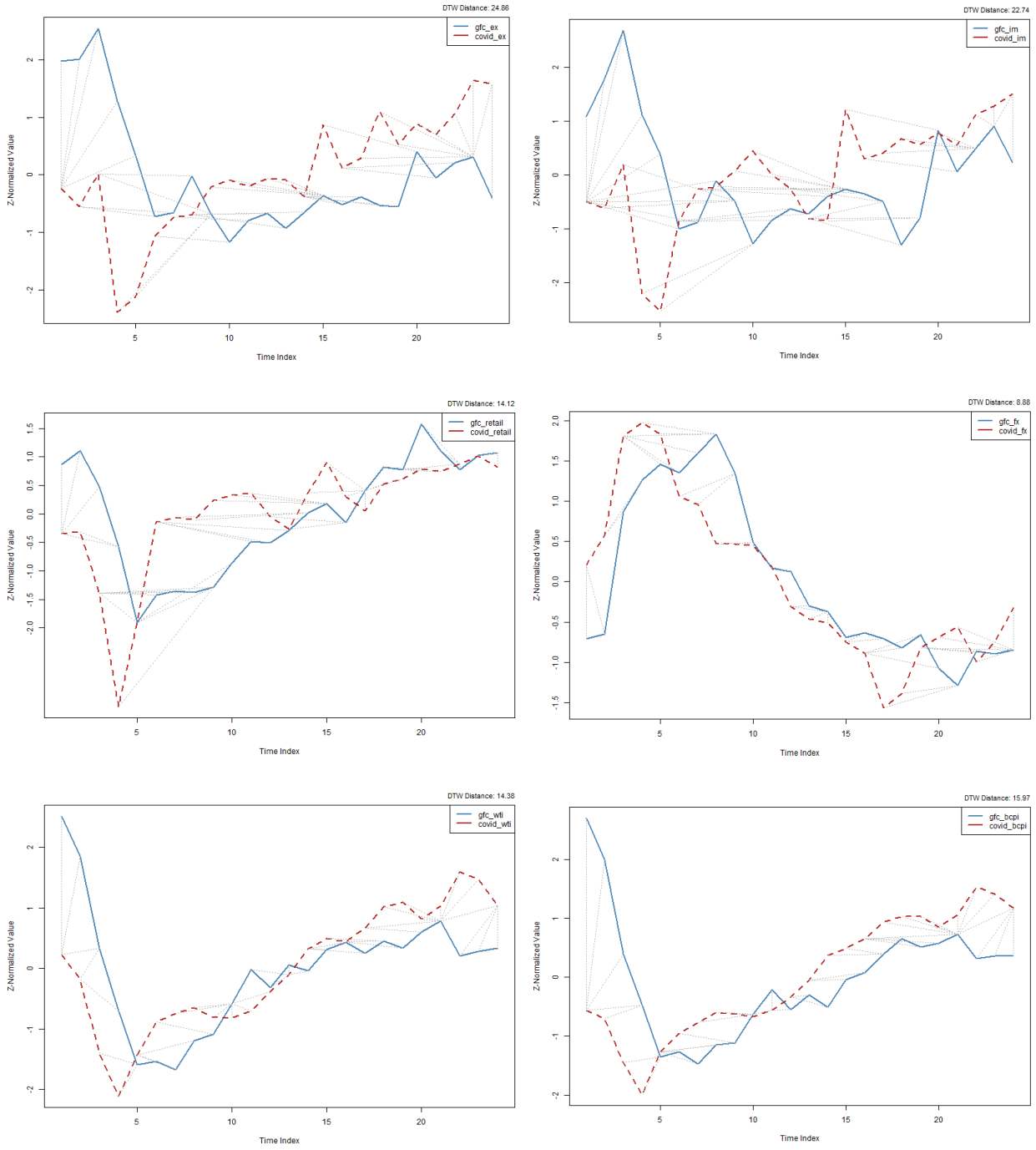
5 Results and Discussion

The DTW analysis of Canadian economic indicators during the GFC and the COVID-19 pandemic was conducted using the R package dtw (Giorgino, 2009). Prior to estimation, all series were standardized using z-normalization to ensure that comparisons reflected patterns of change over time rather than absolute levels.

The results and corresponding alignment plots are presented in Figure 2. Overall, the findings indicate that major economic indicators displayed broadly similar shapes and movement patterns across the two crises. Despite the fundamentally different origins of the shocks, the Canadian economy exhibited comparable turning points and early-recovery dynamics, suggesting that certain macroeconomic adjustment mechanisms operate consistently across crisis types.

Figure 2: *DTW Alignment Plots for Key Economic Indicators during the GFC and COVID-19*





Exchange rates, interest rates, GDP, and commodity prices recorded the lowest DTW distances, indicating the strongest alignment between the two episodes. These similarities are consistent with the idea that both crises triggered rapid monetary easing and sharp declines in global demand, which tend to produce synchronized movements in financial variables and commodity-linked indicators. By contrast, exports and imports exhibited the largest distances,

reflecting more heterogeneous sectoral impacts and differing global transmission channels across the two crises.

Several indicators—particularly unemployment, GDP, and retail sales—displayed sharper and more abrupt movements during COVID-19. This pattern is consistent with the nature of a supply-constraint and mobility-restriction shock, in which mandated shutdowns and sudden drops in contact-intensive activity generate immediate contractions. The rapid rebound in these indicators reflects the temporary nature of the restrictions and the role of labour-hoarding behaviour, as many firms retained workers in anticipation of reopening. In contrast, the GFC produced a financial-demand shock propagated through the financial accelerator: deteriorating balance sheets, tighter credit conditions, and heightened uncertainty led to gradual reductions in spending and investment. As a result, unemployment rose more slowly but remained elevated for a longer period, reflecting persistent labour-market scarring and slower reallocation.

Commodity prices (WTI and BCPI) illustrate both commonalities and differences. In both crises, prices collapsed as global demand contracted. However, the faster rebound during COVID-19 reflects the rapid restoration of mobility, the release of pent-up demand, and the strong fiscal support that boosted household spending. In contrast, the GFC recovery was slower because financial frictions and deleveraging dampened demand for an extended period. Retail trade followed a similar pattern: the COVID-19 collapse was abrupt but short-lived, while the GFC decline was more gradual and persistent, consistent with a demand-driven downturn rather than a supply-side shutdown.

Exchange rates moved in opposite directions to commodity prices, depreciating sharply in the early months of both crises before appreciating as conditions stabilized. The similarity in exchange-rate dynamics reflects Canada's commodity-linked currency and the role of global risk sentiment. Interest rates also recorded a low DTW distance, underscoring the similarity in monetary policy responses. In both crises, the Bank of Canada implemented rapid rate reductions, but the cuts during COVID-19 were more aggressive, reflecting the need to offset an abrupt, policy-induced halt in economic activity rather than a gradual financial contraction.

Inflation rates exhibited moderate similarity across crises. The sharper and more persistent decline during the GFC reflects the deeper demand shortfall and the deflationary effects of

financial deleveraging. In contrast, the CPI decline during COVID-19 was modest and short-lived, consistent with a shock driven by temporary supply constraints rather than a collapse in underlying demand. The subsequent inflationary pressures observed in late 2020 and 2021 also align with supply-chain bottlenecks and sectoral reallocation dynamics.

Exports and imports displayed the highest DTW distances, reflecting the distinct global transmission mechanisms of the two crises. During COVID-19, trade volumes rebounded to pre-crisis levels within six to seven months, consistent with the rapid reopening of global supply chains and strong fiscal support. By contrast, the GFC produced a deeper and more persistent contraction in trade, driven by the collapse in global demand, disruptions in trade finance, and the slow repair of financial intermediation.

Taken together, the results highlight both parallels and distinctions in crisis dynamics. While the overall trajectories of many indicators were broadly similar, the GFC unfolded gradually and generated longer-lasting structural impacts, consistent with financial-accelerator models and prolonged balance-sheet repair. COVID-19 produced a sudden stop followed by a rapid rebound, reflecting the temporary nature of mobility restrictions, labour-hoarding behaviour, and the strong role of fiscal transfers. These differences underscore the importance of distinguishing between financial-demand shocks and supply-constraint shocks when interpreting macroeconomic adjustment patterns.

6 Conclusions

This study compared the responses of key Canadian economic indicators to two major global shocks: the 2008 GFC and the COVID-19 pandemic. Using monthly data from August 2008 to July 2010 and January 2020 to December 2021, and applying DTW to assess similarities in the shape and timing of movements, the analysis revealed a notable degree of convergence across crises. Despite their distinct origins—financial-system fragility versus a public-health-driven supply and mobility shock—most indicators, including unemployment, GDP, trade, commodity prices, and inflation, displayed broadly comparable adjustment paths. The main difference lay in intensity: COVID-19 generated more abrupt but short-lived disruptions, while the GFC produced

a slower, more persistent drag on activity, consistent with the gradual propagation of financial-demand shocks through credit markets and balance-sheet channels.

The observed patterns align with established macroeconomic mechanisms. The GFC's gradual downturn and prolonged recovery are consistent with financial-accelerator dynamics, in which deteriorating balance sheets, tighter credit conditions, and precautionary behaviour amplify and extend the contraction. By contrast, the sudden stop in activity during COVID-19 reflects the immediate impact of supply constraints, mandated shutdowns, and sector-specific mobility restrictions. The rapid rebound in several indicators is also consistent with labour-hoarding behaviour and the temporary nature of many pandemic-related disruptions. These mechanisms help explain why the two crises differ in speed and amplitude despite showing similar overall trajectories.

Monetary and fiscal policy responses formed an important part of the broader macroeconomic environment in both episodes. While DTW is a descriptive tool and cannot isolate the causal impact of policy interventions, the alignment of interest-rate paths across crises reflects the Bank of Canada's use of rapid rate reductions as a stabilizing instrument in periods of acute stress. The more prolonged period of low rates during COVID-19 is consistent with the heightened uncertainty and the need to support an economy constrained by public-health measures rather than financial-market dysfunction. Fiscal policy differed more substantially across episodes: the GFC relied on targeted stimulus measures, whereas COVID-19 prompted large-scale transfers to households and firms. Although DTW cannot attribute specific outcomes to these interventions, the contrasting fiscal approaches reflect the differing nature of the underlying shocks—financial-demand versus supply-constraint—and the policy tools typically associated with each.

Several broader insights emerge from the comparative analysis. First, the broadly similar shapes of many indicators suggest that certain macroeconomic adjustment mechanisms—such as the interplay between demand conditions, labour-market dynamics, and commodity-linked sectors—operate consistently across crises, even when the shocks originate from different sources. Second, the contrasting speeds of adjustment highlight the importance of distinguishing between financial-demand shocks, which propagate gradually through credit and balance-sheet channels, and supply-constraint shocks, which generate immediate but potentially short-lived disruptions. Third, the differences in policy environments across the two episodes underscore the need for

flexible policy frameworks that can adapt to the specific transmission mechanisms of each crisis rather than relying on a uniform response.

Looking forward, Canada's experience points to the value of strengthening preparedness for future shocks. Enhancing fiscal flexibility, improving automatic stabilizers, and expanding real-time economic monitoring could support more timely and better-targeted interventions. While the structural drivers of future crises will differ, the broadly consistent adjustment patterns observed across the GFC and COVID-19 suggest that the Canadian economy responds in predictable ways to large shocks, provided that policy frameworks remain adaptable and responsive to the underlying economic mechanisms.

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Appendix

Table 4: *DTW Alternative Tests Results*

Variable	***Analysis period***	***24-Month Series***	***36-Month Series***	***48-Month Series***
GDP	10.95	21.88	15.64	15.52
CPI	11.65	20.63	15.44	12.05
Unemployment	18.14	32.23	30.56	38.03
Interest rate	8.84	14.16	27.66	48.50
Retail trade	24.86	22.84	24.22	25.08
Exports	22.74	36.65	38.39	39.57
Imports	14.12	31.86	32.65	31.28
Exchange rate	8.88	19	27.29	32.79
WTI	14.38	22.98	30.49	30.78
BCPI	15.97	31.5	36.24	35.56

Notes: *24-month series: GFC (Jan 2008–Dec 2009), COVID-19 (Jan 2020–Dec 2021); 36-month series: GFC (Jan 2008–Dec 2010), COVID-19 (Jan 2020–Dec 2022); 48-month series: GFC (Jan 2008–Dec 2011), COVID-19 (Jan 2020–Dec 2023).*