Economics and Culture
Volume 22(2), 2025 DOI: 10.2478/jec-2025-0019

Income Inequality and Stock Returns: Asymmetric Effects on Canadian Provinces

Research Paper

Nazif Durmaz[1,*], Bin Dai[2]

[1]*Department of Marketing, Global Business & Economics, Kean University, 303-P Hynes Hall, Union, NJ 07083, United States of America,*
ORCID: http://orcid.org/0000-0003-2835-6191
[2]*Department of Marketing, Global Business & Economics, Kean University, Union, NJ 07083, United States of America*

Received 21 July 2025; Accepted 10 December 2025

Abstract: **Research purpose.** Most countries with highly capitalised free markets and countries with dominant state-owned economies may have difficulty in preventing income inequality. Productivity and income distribution are expected to have an impact on income inequality. The present paper aims to discover whether there is an asymmetric effect between Stock Return and Income inequality in Canada at the provincial level.

Design / Methodology / Approach. We analyse annual data from 1976 to 2021 from ten representative Canadian provinces employing an autoregressive distributed lag model (ARDL) for linear and nonlinear model approaches, and reconstruct the error correction model (ECM) to identify aggregation bias.

Findings. While in the long run, the impact on income inequality is not significant due to aggregation, our short-run results indicate a significant relationship between stock returns and income inequality in most of the Canadian provinces.

Originality / Value / Practical implications. There is evidence of these effects of stock returns on income inequality being asymmetric (partial sums have different coefficients in sign and size) in most cases, and this effect may persist in the long term. This asymmetry suggests that policy measures addressing income inequality should account for temporal variations and the differential impacts of financial market developments.

Keywords: *income inequality • stock market returns • Nonlinear ARDL • Canada*

JEL codes: C22; D63; G28

Introduction

When the level of economic and technological development is used as the measurement standard, the relationship between income inequality and economic development is initially positive and becomes negative as the economic level increases (Mdingi & Ho, 2021). Most countries with highly capitalised free markets and countries with dominant state-owned economies cannot prevent income inequality. Productivity and distribution both impact income inequality. Most mainstream countries in the world belong to a market economy, and both government and market regulation and control exist simultaneously. The government mainly regulates income distribution fairness through monetary and economic policies. The US public debt has had an asymmetric impact on income inequality (Bahmani-Oskooee et al. 2025).

In terms of the market, the development of the financial system will also affect income distribution, thereby affecting income equality. The development of the financial system affects income inequality negatively (Inoue, 2024).

* *Email: ndurmaz@kean.edu*

The income types of residents can mainly be divided into wage income and capital income. Income from financial investment activities is divided into capital income, which will influence income inequality. In addition, economic policies such as taxation and transfer payments have also had an impact on income inequality.

The present study examines how stock returns (the Stock Market Index) impact income inequality (Gini or GINI). The stock market is a key part of the financial system and is closely linked to economic growth. This study shows that both linear and nonlinear models distinguish aggregation bias when measuring the effects of economic growth on income inequality across Canadian provinces. We find that only six of ten provinces reflect a reduction in inequality by growth, with differences largely tied to regional policies and industrial structures. The analysis also highlights that these impacts are asymmetric and can persist over time, with emphasis on region-specific links between economic growth, financial markets, and inequality in Canada.

Literature review

Canada's income inequality

The research on the influencing factors of income inequality in Canada focuses on Canada's economic policies, income distribution patterns, and changes in financial markets. According to Beach (2016), the moderate-income group of Canada was decreasing while low-income and high-income groups were increasing, which caused hollowing out of Canada's labour market. Geographical locations also have an impact on income inequality. Marchand et al. (2020) revealed that regions that possess a highly concentrated manufacturing industry characteristically have lower levels of inequality, whereas regions which possess a highly concentrated tertiary industry have higher levels of inequality. Burkinshaw et al. (2022) report that the after-tax Gini in Canada grew by over 0.3, and since the late 1990s, income inequality has been relatively stable. Garcia and Cross (2024) indicate that contractionary monetary policy shocks in the G7 countries lead to larger income inequality, but, when inflation targeting is accounted for, this effect disappears in Canada. Borwein et al. (2025) find minimal evidence between income inequality and parent spending on education for both high-income groups and highly educated groups in Canada. Das et al. (2025) conclude a significant negative relationship between unionisation and income inequality in Canada.

The impact of distribution policies

Frenette et al. (2007) concluded that in the 1980s and as well as 1990s, income inequality was on the rise, but the tax and transfer system offset the influence. Brzozowski et al. (2010) concluded that wealth inequality has remained relatively stable since the late 1990s in Canada. Pástor and Veronesi (2016) considered that while the increase in tax rates will initially exacerbate income inequality, they will ultimately lead to improvement.

Bowlus et al. (2022) pointed out that the distribution of income inequality and income growth varies greatly throughout the entire business cycle, and the income dynamics of individuals are associated with the scale and employment growth of their employers. Engbom et al. (2022) pointed out the difference in the impact of inequality and dynamics between the formal and informal sectors in Brazil and observed an important decline in inequality in the formal industry. MacGee and Rodrigue (2025) show that changes throughout the income distribution equally help clarify observed differences in labour productivity between Canada and the United States.

The impact of finance on income inequality

Alexiou et al. (2022) found that financialisation had a positive impact on income inequality, although the results were subject to measuring proxies of financialisation and income inequality. Chletsos and Sintos (2023) report that some publications moderately conclude that financial development increases income inequality. Zhang and Naceur (2019) revealed that four dimensions of financial development - access, depth, efficiency, and stability - can improve inequality and poverty. However, in the fifth dimension, financial liberalisation will exacerbate inequality.

Hsieh et al. (2019) further emphasised the structure of the financial market and bank market and concluded that a non-monopolistic banking industry and more competition can alleviate income inequality, but the entire financial development will be detrimental to fair income distribution in their sample. Dorn et al. (2022) studied more than 130 countries and found that trade openness increased income inequality in most advanced economies.

Bilias et al. (2017) found no link between greater stock access and lower net wealth inequality. Batabyal and Killins (2021) suggested that the following pattern of the stock returns of Canada and the U.S. can be predicted over a short-term period, which caused anomalous profits. In their long panel study among OECD countries, Hailemariam

et al. (2021) conclude that positive innovation shocks impact income inequality negatively at first; however, later, they increase inequality among top income groups. De Vita and Luo (2021) analyse data from over 30 countries and find that household financialisation has a consistently positive and significant effect on income inequality.

Markiewicz and Raciborski (2022) demonstrated that capital income inequality in the United States is positively related to real excess equity returns; however, the labour share of income is inversely related to excess returns. Bahmani-Oskooee et al. (2022) concluded that while positive stock returns have unbalancing impacts on income inequality, negative stock returns have balancing impacts. Öndes and Kızılgöl (2024) report that while economic globalisation contributes to rising income inequality, foreign direct investment lowers it, and GDP and financial development raise the Gini.

Research methodology

The data definitions and the sources are detailed in Appendix 1 at the end of the paper. Canada's share prices and income levels are reported in constant values. Our dataset uses the most recent annual data from 1976 to 2021. After adding significantly related independent variables, our first model follows:

$$LnGINI_t = a + bLnY_t + cLnSMI_t + \xi \tag{1}$$

Gini measures income inequality: a higher Gini coefficient means greater inequality. Y is per-capita income, indicating economic activity. SMI stands for Stock Market Index, reflecting stock market returns. This is a long-term model. If the values of b and c are negative, it means that both per capita income and stock return growth will reduce income inequality. If b and c are positive numbers, then the growth in per capita income and stock returns will exacerbate income inequality.

To further understand the short-term impact of SMI and Y on Gini, it is not enough to use the long-term model alone. Therefore, we referred to Pesaran et al.'s (2001) autoregressive distributed lag model (ARDL) approach and reconstructed the following error correction model (ECM), which is based on the previous model:

$$\begin{aligned}\Delta LnGINI_t = a + \sum_{j=1}^{n1} \delta_j \Delta LnGINI_{t-j} + \sum_{j=0}^{n2} \varepsilon_j \Delta LnY_{t-j} + \sum_{j=0}^{n3} \kappa_j \Delta LnSMI_{t-j} + \\ \Upsilon_1 \mathrm{LnGINI}_{t-1} + \Upsilon_2 \mathrm{LnY}_{t-1} + \Upsilon_3 \mathrm{LnSMI}_{t-1} + \xi_t\end{aligned} \tag{2}$$

The advantage of the second model is that it integrates the effects of short-term and long-term effects. δ, ε and κ represent the impact of short-term lag effects on each independent variable separately. And γ_1, γ_2 and γ_3 represent the long-term impact of the independent variable on the dependent variable. ξ_t considered the impact of other potential influencing factors that have not been considered over time. In addition, the T-test and F-test, as diagnostic methods which were proposed by Pesaran et al. (2001), will also be utilised to measure the significance of these coefficients[1].

$$\begin{aligned}POS_t &= \sum_{i=1}^{t} \Delta LnSMI_i^+ = \sum_{i=1}^{t} max(\Delta LnSMI_m, 0) \\ NEG_t &= \sum_{i=1}^{t} \Delta LnSMI_i^- = \sum_{i=1}^{t} min(\Delta LnSMI_m, 0)\end{aligned} \tag{3}$$

To investigate the asymmetric effect of SMI on Gini, we conducted a study based on the findings of Shin et al. (2014), reconstructing SMI into two new variables, POS and NEG. POS represents the sum of positive changes in the stock market index (the positive component of ΔLnSMI), while NEG reflects the sum of negative changes (the negative component of ΔLnSMI). And the new model follows:

1 See the following examples, Aftab et al. (2017), Baghestani and Kherfi (2015), Bahmani-Oskooee and Durmaz (2016, 2021), Durmaz (2015, 2024), Durmaz et al. (2025), Gogas and Pragidis (2015).

$$\Delta LnGINI_t = a + \sum_{j=1}^{n1} b_j \Delta LnGINI_{t-j} + \sum_{j=0}^{n2} c_j \Delta LnY_{t-j} + \sum_{j=0}^{n3} d_j \Delta LnPOS_{t-j} + \sum_{j=0}^{n4} e_j \Delta LnNEG_{t-j} +$$
$$\omega_1 \mathrm{LGINI}_{t-1} + \omega_2 \mathrm{LnY}_{t-1} + \omega_3 \mathrm{LnPOS}_{t-1} + \omega_4 \mathrm{LnNEG}_{t-1} + \mu_t \quad (4)$$

When we make nonlinear adjustments to the variable SMI in the linear ARDL model (2), we obtain a nonlinear ARDL model (4). Shin et al. (2014) revealed that linear ARDL and nonlinear ARDL are both applicable to OLS and the Inspection methods of Pesaran et al. (2001). After estimating OLS for the ECM model (4), we can start testing the asymmetric effect hypothesis. Firstly, if the estimation of dm and em is different, it can prove that the short-term impact of SMI on Gini is asymmetric. Secondly, if $\omega_{\_3}$ is not equal to $\omega_{\_4}$, that means asymmetry exists in the short-term adjustment.

Research results

Table 1 shows descriptive statistics for Gini and income levels in Canada and its provinces. We applied Narayan's (2005) F-test critical values and Banerjee et al. (1998) T-test critical values. A first-order lag was added to each annual differential variable to capture short-term dynamics between variables.

Panel A in Table 2 shows the impact of various variables on the Canadian Gini coefficient in the short term. A negative ΔLnY_t coefficient suggests that short-term economic growth in Canada will improve income inequality, contrary to Bahmani-Oskooee and Gelan (2008). This may be due to Canada's transfer payment and redistribution policies. In contrast, a positive coefficient for stock returns indicates that short-term increases in stock returns worsen inequality, though this effect does not persist long term. The significance of the F-test further confirms the correctness of the conclusion. Using the NARDL model, we have obtained further conclusions. The impact of economic growth remains consistent with linear models. However, the coefficient of ΔPOS_{t-1} indicates that the growth of stock returns worsens income inequality, while the ΔNEG_{t-1} coefficient indicates that a decrease in stock returns will improve income inequality. The findings show that stock returns have asymmetric effects on Gini index in the short run, supporting our hypothesis. This conclusion is further validated by the Wald Test. On the other hand, these short-term effects do not persist over a longer period. Additionally, our results differ from those observed at the provincial level and are influenced by the aggregation effect.

Using the L-ARDL model for Newfoundland, in the short run, ΔLnY_t does not have a significant impact on Gini, but when we use the N-ARDL model, ΔLnY_t has a significant positive impact on Gini, demonstrating the worsening effect of economic growth on inequality. The data difference in this province fully demonstrates the superiority of the N-ARDL model, which is a good supplement to L-ARDL. Even if a link cannot be concluded through L-ARDL, with the help of N-ARDL, we can still find relationships. The coefficients of ΔLnY_t in Ontario, Quebec, are negative, suggesting economic growth reduces income inequality, while those for Nova Scotia and Prince Edward Island are positive, indicating growth increases inequality. Except in Nova Scotia, short-run effects in other provinces do not persist long-term. Both N-ARDL and L-ARDL yield consistent short-term results for Ontario, Quebec, Nova Scotia, and Prince Edward Island. Only in Nova Scotia does economic growth have a lasting effect on the Gini index, ultimately improving income inequality over time.

Among the short-run results, Ontario and Nova Scotia's coefficient of $\Delta LnSMI_t$ or $\Delta LnSMI_{t-1}$ is estimated to be negative, indicating that the growth of stock returns will improve income inequality. However, Nova Scotia's short-term effects did not extend into the long term. In the long run, the coefficient of ΔLnY_t for Ontario is positive, indicating that the growth of Stock returns will increase income inequality. Quebec's $\Delta LnSMI_t$ is estimated to be positive, indicating that an increase in Stock Returns in the short term will also exacerbate income inequality, and the short-term effect has not continued into the long term.

In the N-ARDL model, the coefficient of Ontario's ΔPOS_t (or ΔPOS_{t-1}) is negative, indicating that in the short term, the growth of Stock Return will suppress income inequality. However, in the long term, the coefficient of ΔPOS_{t-1} is positive, indicating that the growth of Stock Return will exacerbate income inequality. The coefficient of Quebec is estimated to be positive, but it has not continued into the long term. These two provinces' ΔNEG_t (or ΔNEG_{t-1}) did not show a significant impact on income inequality, proving the short-term asymmetric effect.

Table 1. Descriptive Statistics (Source: Authors' Computations)

GINI							
Province	Abr.	Mean	St. Dev.	Min.	Max	Kurtosis	Skewness
Canada	CND	0.301	0.013	0.281	0.322	-1.601	0.011
Ontario	ON	0.302	0.018	0.272	0.332	-1.516	-0.148
Quebec	QC	0.284	0.010	0.261	0.301	-0.503	-0.391
Nova Scotia	NS	0.285	0.012	0.260	0.306	-0.865	-0.395
New Brunswick	NB	0.280	0.010	0.265	0.299	-0.985	0.132
Manitoba	MB	0.291	0.010	0.269	0.313	-0.202	-0.056
British Columbia	BC	0.301	0.017	0.270	0.341	-0.635	0.162
Prince Edward Island	PE	0.267	0.016	0.238	0.314	0.420	0.590
Saskatchewan	SK	0.300	0.013	0.266	0.328	-0.086	-0.115
Alberta	AB	0.301	0.013	0.274	0.326	-0.716	0.120
Newfoundland and Labrador	NL	0.291	0.013	0.264	0.314	-0.926	-0.445
INCOME							
Province	Abr.	Mean	St. Dev.	Min.	Max	Kurtosis	Skewness
Canada	CND	44186.96	4080.28	39400.00	54000.00	-0.55	0.75
Ontario	ON	46615.22	3476.97	41100.00	55500.00	-0.24	0.47
Quebec	QC	40867.39	3662.24	36100.00	51200.00	0.57	0.97
Nova Scotia	NS	38393.48	4507.15	32600.00	48100.00	-0.85	0.68
New Brunswick	NB	36793.48	4418.37	31500.00	47400.00	-0.26	0.95
Manitoba	MB	40726.09	4422.99	34800.00	49900.00	-0.96	0.73
British Columbia	BC	44545.65	3498.43	40400.00	54700.00	0.96	1.10
Prince Edward Island	PE	35339.13	5148.79	29800.00	46500.00	-0.81	0.77
Saskatchewan	SK	42441.30	6661.48	35100.00	55200.00	-1.20	0.70
Alberta	AB	49765.22	7440.91	40700.00	64000.00	-1.27	0.51
Newfoundland and Labrador	NL	36556.52	6906.86	28700.00	49300.00	-0.87	0.86

Nova Scotia's ΔNEG_t (or ΔNEG_{t-1}) coefficient is negative, indicating that a decrease in Stock Return will improve income inequality, and ΔNEG_t also has a significant impact on Gini, indicating that the short-term effect continues into the long-term. The coefficients for British Columbia, Alberta, and Newfoundland are negative; however, unlike Nova Scotia, their short-term effects do not persist in the long term.

Economic growth affects each province differently and shows aggregation bias, as data from only six out of ten typical provinces support our findings. Our conclusions apply to these specific regions. In Canada overall, economic growth reduced income inequality, a result that contrasts with much previous research; Ontario and Quebec show similar patterns, likely due to local policies or industry distributions. A novel finding, Nova Scotia's economic growth impacts income inequality in opposite ways over the short and long term. Likewise, nonlinear models reveal that stock returns have conflicting effects. The linear model confirms that stock returns affect income inequality asymmetrically in the short term and potentially into the long term.

Finally, Panel C in Table 2 summarises the diagnostic statistics for both the ARDL and the N-ARDL models across provinces. Most provinces show higher F-test values, indicating joint significance of variables in the models. Serial correlation (LM) tests are not significant, supporting the assumption of independent residuals and, absence of autocorrelation. RESET tests mostly confirm model reliability, except for British Columbia's NARDL model. The negative and significant ecm_{t-1} coefficients indicate cointegration in several provinces, while adjusted R-squared values suggest strong explanatory power overall. Stability tests highlight stable coefficients for most provinces. Wald test statistics reveal no notable nonlinear effects except in British Columbia and Alberta, highlighting varied performance across provinces for the L-ARDL and N-ARDL models.

Table 2. Linear and Non-Linear ARDL Model Estimates (Source: Authors' Computations).

	Canada		Ontario		Quebec		Nova Scotia	
	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL
Panel A: Short-run estimates								
$\Delta LnGINI_{(t-1)}$	-0.52(-2.79)**	-0.43(-2.44)**			-0.27(-1.62)	-0.30(-1.63)		
ΔLnY_t	-0.41(-2.42)**	-0.19(-2.85)**	-0.20(-2.03)**	-0.17(-1.75)*	-0.19(-3.08)**	-0.22(-3.07)**	0.32(1.73)*	0.32(1.73)*
$\Delta LnY_{(t-1)}$								0.35(1.56)
$\Delta LnSI_t$	0.20(2.18)**		0.02(0.76)		0.02(2.50)**		-0.04(-1.37)	
$\Delta LnSI_{(t-1)}$			-0.08(-3.71)**				-0.07(-2.28)**	
ΔPOS_t		0.05(-1.88)*		0.10(1.14)		0.11(1.19)		-0.06(-1.48)
$\Delta POS_{(t-1)}$				-0.26(-2.95)**		0.21(2.22)**		
ΔNEG_t		-0.03(-0.37)		0.05(0.34)		-0.09(-0.78)		-0.35(-2.31)**
ΔNEG(t-1)		-0.16(-1.77)*		-0.21(-1.61)				
Panel B: Long-run estimates								
LnY_t	14.51(-0.15)	-4.02(-0.51)	-1.25(-1.64)	-1.03(-1.52)	-1.00(-1.34)	-1.19(-1.23)	-0.44(-1.67)	-0.70(-2.39)**
$LnSI_t$	-1.14(-0.15)		0.13(2.32)**		0.09(1.49)		0.04(1.32)	
POS_t		0.98(-0.58)		0.60(2.06)**		0.04(0.19)		-0.15(-1.38)
NEG_t		1.37(-0.52)		1.31(1.56)		-0.50(-0.62)		-0.84(-2.09)**
Panel C: Diagnostic statistics								
F	2.53*	1.7	2	2.32*	2.52*	2.60*	2.55*	2.25*
LM	0.81	1.45	0.04	0.44	1.04	1.43	0.8	0.37
RESET	0.04	0	0.06	0.09	0.03	0.1	0.07	0.85
Adjusted R^2	0.21	0.22	0.25	0.28	0.21	0.25	0.26	0.24
ecm_{t-1}	0.01(-0.15)	-0.05(-0.53)	-0.16(-1.70)*	-0.17(-1.77)*	-0.19(-1.52)	-0.18(-1.44)	-0.33(-2.80)**	-0.41(-3.22)**
CUSUM(SQ)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)	US(S)	S(S)
Wald Test(SR)		0.12		0.35		2.53		3.23
Wald Test(LR)		3.1		1.87		2.08		2.1

Linear and Non-Linear ARDL Model Estimates continued (Source: Authors' Computations)

	New Brunswick		Manitoba		British Columbia		Prince Edward	
	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL
Panel A: Short-run estimates								
$\Delta LnGINI_{(t-1)}$			-0.37(-2.06)**	-0.37(-2.06)**	-0.30(-1.90)*	-0.31(-2.02)*		
ΔLnY_t	-0.08(-1.48)	-0.10(-1.36)	0.21(1.26)	0.21(1.25)	-0.13(-1.55)	-0.13(-1.51)	0.52(2.33)**	0.53(2.33)**
$\Delta LnY_{(t-1)}$								
$\Delta LnSI_t$	0.01(1.23)		0.01(0.70)		0.01(0.74)		0.002(0.09)	
$\Delta LnSI_{(t-1)}$								
ΔPOS_t		0.02(0.56)		0.004(0.10)		0.05(1.22)		0.02(0.34)
$\Delta POS_{(t-1)}$								
ΔNEG_t		-0.01(-0.06)		-0.03(-0.26)		-0.34(-1.98)*		0.08(0.48)
$\Delta NEG_{(t-1)}$						-0.28(-1.57)		

(*continued*)

Table 2. Continued

	Canada		Ontario		Quebec		Nova Scotia	
	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL
Panel B: Long-run estimates								
LnY_t	-0.34(-1.30)	-0.38(-1.25)	-0.42(-0.59)	-0.57(-0.58)	-0.65(-1.35)	-0.49(-1.52)	-0.05(-0.14)	0.11(0.24)
$LnSI_t$	0.04(1.13)		0.04(0.53)		0.04(1.06)		0.01(0.09)	
POS_t		0.07(0.54)		0.02(0.10)		0.21(1.28)		0.06(0.33)
NEG_t		-0.02(-.06)		-0.18(-0.24)		0.41(0.80)		0.28(0.48)
Panel C: Diagnostic statistics								
F	2.55*	4.51**	2.58*	3.73**	1.51	1.73	3.07**	2.33*
LM	0.01	0.02	0.32	0.38	0.48	0.87	0.78	0.61
RESET	0.04	0.09	0.15	0.14	0.99	3.54*	0.15	0.38
Adjusted R^2	0.09	0.07	0.23	0.21	0.14	0.27	0.2	0.18
ecm_{t-1}	-0.25(-2.39)**	-0.25(-2.38)**	-0.18(-1.08)	-0.17(-1.00)	-0.20(-1.49)	-0.26(-2.08)**	-0.27(-2.32)**	-0.28(-2.35)**
CUSUM(SQ)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)
Wald Test(SR)		0.3		0.1		7.69*		0.78
Wald Test(LR)		0		0.29		0.05		0.34
Linear and Non-Linear ARDL Model Estimates continued (Source: Authors' Computations)								
Panel A: Short-run estimates								
$\Delta LnGINI_{(t-1)}$	-0.54(-3.36)**	-0.54(-3.31)**			-0.26(-1.53)	-0.25(-1.47)		
ΔLnY_t	0.24(1.11)	0.26(1.11)	0.39(2.80)**	0.46(3.14)**	0.36(1.68)	0.38(1.72)*		
$\Delta LnY_{(t-1)}$								
$\Delta LnSI_t$	-0.001(-0.08)		0.003(0.31)		-0.003(-0.23)			
$\Delta LnSI_{(t-1)}$								
ΔPOS_t		-0.01(-0.23)		0.02(0.32)		-0.01(-0.18)		
$\Delta POS_{(t-1)}$								
ΔNEG_t		-0.04(-0.23)		0.02(0.08)		-0.05(-0.21)		
$\Delta NEG_{(t-1)}$				-0.36(-1.94)*		-0.39(-1.83)*		
Panel B: Long-run estimates								
LnY_t	-0.26(-0.50)	-0.31(-0.52)	0.03(0.26)	0.03(0.19)	0.06(0.47)	0.04(0.25)		
$LnSI_t$	-0.01(-0.08)		0.01(0.31)		-0.01(-0.22)			
POS_t		-0.08(-0.24)		0.04(0.33)		-0.03(-0.17)		
NEG_t		-0.25(-0.23)		0.07(0.21)		-0.08(-0.14)		
Panel C: Diagnostic statistics								
F	0.86	0.67	2.78*	2.12	1.46	1.84		
LM	0.00	0.00	0.02	1.68	1.59	0.50		
RESET	0.84	0.82	0.72	0.05	0.35	0.30		
Adjusted R^2	0.40	0.39	0.31	0.33	0.35	0.37		

(*continued*)

Table 2. Continued

	Canada		Ontario		Quebec		Nova Scotia	
	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL	L-ARDL	N-ARDL
ecm_{t-1}	-0.17(-0.96)	-0.17(-0.96)	-0.46(-3.54)**	-0.47(-3.57)**	-0.38(-1.92)*	-0.39(-1.97)*		
CUSUM(SQ)	S(S)	US(S)	S(S)	S(S)	S(S)	S(S)		
Wald Test(SR)		0.02		10.61*		1.93		
Wald Test(LR)		0.63		0.00		0.03		

Notes:
a) The numbers in parentheses are T-ratio's value, ** and * significance in 5% and 10%.
b) F-test, ** and * are the same as the T-test.
c) LM test is a Lagrange multiplier test used to examine whether there are unobserved patterns in a model.
d) The RESET test is used to confirm the reliability of the model.
e) The Wald Test is to test the asymmetric effects of long and short-term changes in the POS and NEG of Stock Returns.

Conclusions

The purpose of the present paper is to further investigate whether there is an asymmetric effect between Stock Return and Income inequality in Canada. Both linear and nonlinear models reveal the presence of aggregation bias in economic growth. This bias manifests in varying impacts across provinces, highlighting the diverse economic realities within Canada. The study finds that only six provinces support the conclusions, underscoring the regional limitations of the findings.

In Nova Scotia, economic growth exhibits opposing effects on income inequality in the short and long term. This suggests that local economic factors and policy interventions may play a significant role in shaping inequality dynamics. Similarly, in Ontario, stock market returns show conflicting impacts on income inequality within nonlinear models. These contradictions highlight the complexity of economic systems and point to potential areas for future research. Another key finding is the validation of the study's hypothesis through linear model analysis: stock market returns exert asymmetric effects on income inequality in the short term, potentially persisting in the long term. This asymmetry suggests that policy measures addressing income inequality should account for temporal variations and the differential impacts of financial market developments. Because of the relatively limited number of observational units and the restricted sample size, the constructed models may contain certain estimation errors. Moreover, given the relatively long time span of the dataset, the potential influence of external macroeconomic and structural factors may not have been fully accounted for. Although this study employs both ARDL and NARDL models and introduces lagged variables to mitigate the impact of endogenous or non-target variables, the possibility of residual estimation bias in the empirical results cannot be entirely ruled out.

For Canadian policy makers, targeted improvements to tax and transfer payment systems are crucial, especially in specific provinces where inequality remains more pronounced. In addition, the sustained trend of financial market liberalisation requires attention. Policy makers should implement strict regulatory measures to mitigate these risks while ensuring the efficient and transparent operation of financial markets. The impact of different trends in stock return on income inequality in the long and short term may be a future research direction.

References

Aftab, M., Syed, K. B. S., & Katper, N. A. (2017). Exchange-rate volatility and Malaysian-Thai bilateral industry trade flows. *Journal of Economic Studies*, *44*(1), 99–114. https://doi.org/10.1108/JES-05-2015-0091

Alexiou, C., Trachanas, E., & Vogiazas, S. (2022). Income inequality and financialization: A not so straightforward relationship. *Journal of Economic Studies*, *49*(1), 95–111. https://doi.org/10.1108/JES-05-2020-0202

Baghestani, H., & Kherfi, S. (2015). An error-correction modeling of US consumer spending: Are there asymmetries? *Journal of Economic Studies*, *42*(6), 1078–1094. https://doi.org/10.1108/JES-04-2014-0065

Bahmani-Oskooee, M., & Durmaz, N. (2016). Exchange rate volatility and Turkish commodity trade with the rest of the world. *Economic Change and Restructuring, 49,* 1–21. https://doi.org/10.1007/s10644-015-9172-8

Bahmani-Oskooee, M., & Durmaz, N. (2021). Exchange rate volatility and Turkey–EU commodity trade: An asymmetry analysis. *Empirica, 48*(2), 429–482. https://doi.org/10.1007/s10663-020-09472-8

Bahmani-Oskooee, M., & Gelan, A. (2008). Kuznets inverted-U hypothesis revisited: A time-series approach using US data. *Applied Economics Letters*, *15*(9), 677–681. https://doi.org/10.1080/13504850600749040

Bahmani-Oskooee, M., Hasanzade, M., & Karamelikli, H. (2025). On the link between US national debt and income distribution: Asymmetric evidence from state level data. *The Journal of Economic Asymmetries*, *32,* e00428. https://doi.org/10.1016/j.jeca.2025.e00428

Bahmani-Oskooee, M., Hasanzade, M., & Bahmani, S. (2022). Stock returns and income inequality: asymmetric evidence from state level data in the US. *Global Finance Journal*, *52,* 100715. https://doi.org/10.1016/j.gfj.2022.100715

Banerjee, A., Dolado, J., & Mestre, R. (1998). Error-correction mechanism tests for cointegration in a single-equation framework. *Journal of Time Series Analysis*, *19*(3), 267–283. https://doi.org/10.1111/1467-9892.00091

Batabyal, S., & Killins, R. (2021). Economic policy uncertainty and stock market returns: Evidence from Canada. *The Journal of Economic Asymmetries*, *24,* e00215. https://doi.org/10.1016/j.jeca.2021.e00215

Beach, C. M. (2016). Changing income inequality: A distributional paradigm for Canada. *The Canadian Journal of Economics*, *49*(4), 1229–1292. https://doi.org/10.1111/caje.12248

Bilias, Y., Georgarakos, D., & Haliassos, M. (2017). Has greater stock market participation increased wealth inequality in the US? *Review of Income and Wealth*, *63*(1), 169–188. https://doi.org/10.1111/roiw.12225

Burkinshaw, S., Terajima, Y., & Wilkins, C. (2022) *Income inequality in Canada*. Staff Discussion Paper 2022-16. Canada: Bank of Canada. https://doi.org/10.34989/sdp-2022-16

Borwein, S., White, L. A., Dhuey, E., & Farney, J. (2025). Income inequality and parent education spending in Canada. *Canadian Journal of Political Science*, 1–30. https://doi.org/10.1017/S0008423925100516

Bowlus, A., Gouin-Bonenfant, É., Liu, H., Lochner, L., & Park, Y. (2022). Four decades of Canadian earnings inequality and dynamics across workers and firms. *Quantitative Economics*, *13*(4), 1447–1491. https://doi.org/10.3982/QE1846

Brzozowski, M., Gervais, M., Klein, P., & Suzuki, M. (2010). Consumption, income, and wealth inequality in Canada. *Review of Economic Dynamics*, *13*(1), 52–75. https://doi.org/10.1016/j.red.2009.10.006

Chletsos, M., & Sintos, A. (2023). Financial development and income inequality: A meta-analysis. *Journal of Economic Surveys*, *37*(4), 1090–1119. https://doi.org/10.1111/joes.12528

Das, A., Hudson, I., & Hudson, M. (2025). Unionization rates, inequality, and poverty in Canadian provinces 2000–2020. *Capital & Class*, *49*(3), 441–466. https://doi.org/10.1177/03098168241269173

De Vita, G., & Luo, Y. (2021). Financialization, household debt and income inequality: Empirical evidence. *International Journal of Finance & Economics*, *26*(2), 1917–1937. https://doi.org/10.1002/ijfe.1886

Dorn, F., Fuest, C., & Potrafke, N. (2022). Trade openness and income inequality: New empirical evidence. *Economic Inquiry*, *60*(1), 202–223. https://doi.org/10.1111/ecin.13018

Durmaz, N. (2015). Industry level J-curve in Turkey. *Journal of Economic Studies, 42*, 689–706. https://doi.org/10.1108/JES-08-2013-0122

Durmaz, N. (2024). The effects of policy uncertainty on stock prices: revisiting with selected countries. *Ekonomika*, *103*(3), 57–69. https://doi.org/10.15388/Ekon.2024.103.3.4

Durmaz, N., J. Zheng, & Zhou, P. (2025). Stock returns and income inequality in emerging economies: Asymmetric evidence from BRICS and MIKTA. *Global Journal of Emerging Market Economies, 17*(3), 375-389. https://doi.org/10.1177/09749101251319584

Engbom, N., Gonzaga, G., Moser, C., & Olivieri, R. (2022). Earnings inequality and dynamics in the presence of informality: The case of Brazil. *Quantitative Economics*, *13*(4), 1405–1446. https://doi.org/10.3982/QE1855

Frenette, M., Green, D. A., & Milligan, K. (2007). The tale of the tails: Canadian income inequality in the 1980s and 1990s. *Canadian Journal of Economics*, *40*(3), 734–764. https://doi.org/10.1111/j.1365-2966.2007.00429.x

Garcia, F. T., & Cross, J. L. (2024). The impact of monetary policy on income inequality: Does inflation targeting matter? *Finance Research Letters*, *61*, 105006. https://doi.org/10.1016/j.frl.2024.105006

Gogas, P., & Pragidis, I. (2015). Are there asymmetries in fiscal policy shocks? *Journal of Economic Studies*, *42*(2), 303–321. https://doi.org/10.1108/JES-04-2013-0059

Hailemariam, A., Sakutukwa, T., & Dzhumashev, R. (2021). Long-term determinants of income inequality: evidence from panel data over 1870–2016. *Empirical Economics*, *61*(4), 1935–1958. https://doi.org/10.1007/s00181-020-01956-7

Hsieh, J., Chen, T. C., & Lin, S. C. (2019). Financial structure, bank competition and income inequality. *The North American Journal of Economics and Finance*, *48,* 450–466. https://doi.org/10.1016/j.najef.2019.03.006

Inoue, T. (2024). Financial inclusion and income distribution revisited: New findings. *The Quarterly Review of Economics and Finance*, *98,* 101940. https://doi.org/10.1016/j.qref.2024.101940

MacGee, J., & Rodrigue, J. (2025). The distributional origins of the Canada-US GDP and labour productivity gaps. *Canadian Public Policy*, *51*(S1), 76–103. https://doi.org/10.3138/cpp.2024-049

Marchand, Y., Dubé, J., & Breau, S. (2020). Exploring the causes and consequences of regional income inequality in Canada. *Economic Geography*, *96*(2), 83–107. https://doi.org/10.1080/00130095.2020.1715793

Markiewicz, A., & Raciborski, R. (2022). Income inequality and stock market returns. *Review of Economic Dynamics*, *43,* 286–307. https://doi.org/10.1016/j.red.2021.01.001

Mdingi, K., & Ho, S. Y. (2021). Literature review on income inequality and economic growth. *MethodsX*, *8,* 101402. https://doi.org/10.1016/j.mex.2021.101402

Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics*, *37*(17), 1979–1990. https://doi.org/10.1080/00036840500278103

Öndes, H., & Kızılgöl, Ö. (2024). Financial development and income inequality in newly industrialized countries: Does financial Kuznets curve exists? *Journal of the Knowledge Economy*, *15*(4), 15618–15651. https://doi.org/10.1007/s13132-023-01705-y

Pástor, L., & Veronesi, P. (2016). Income inequality and asset prices under redistributive taxation. *Journal of Monetary Economics, 81,* 1–20. https://doi.org/10.1016/j.jmoneco.2016.03.004

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326. https://doi.org/10.1002/jae.616

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In Sickles, R., &. W. Horrace (eds), *Festschrift in honor of Peter Schmidt: Econometric methods and applications* (pp. 281-314). Springer New York. https://doi.org/10.1007/978-1-4899-8008-3_9

Zhang, R., & Naceur, S. B. (2019). Financial development, inequality, and poverty: Some international evidence. *International Review of Economics & Finance*, *61*, 1–16. https://doi.org/10.1016/j.iref.2018.12.015

APPENDIX

Appendix 1. Definitions of variables and sources

Annual province-level data between the years 1976–2021 for each case.

GINI = Gini coefficients are collected from Statistics Canada, and each province's values are of adjusted market, total, and after-tax income.

Y = Real income of individuals all come from Statistics Canada. Available for Canada and provinces in 2022, constant prices.

POPULATION = Annual population estimates in each province and Canada. Datasets are obtained from Statistics Canada.

SMI = Share prices of Canada (Total); these values are not seasonally adjusted. In 2022, constant prices.