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Beyond growth: Macroeconomic drivers of poverty in the U.S. and Canada

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ABSTRACT

This study explores the macroeconomic and social determinants of poverty in the United States and Canada from 1980 to 2023, using the poverty headcount ratio at $4.20/day. It employs the Autoregressive Distributed Lag (ARDL) model and Error Correction Model (ECM) to examine both short-run and long-run dynamics between poverty and six key variables: GDP per capita growth, income share of the bottom 20%, school enrollment, inflation, labor force participation, and government consumption expenditure. The results for the United States indicate strong long-run relationships, with income distribution, education, inflation, and labor force participation showing significant impacts on poverty. The ARDL model explains 95% of the variation in poverty, and the ECM confirms a stable adjustment toward long-run equilibrium. In contrast, the Canadian model explains 58% of the variation, with inflation, income share, and labor market variables showing notable effects, while education and government spending play more modest roles. These differences reflect how national welfare systems and institutional responses to macroeconomic pressures shape poverty outcomes. The comparative analysis highlights how differing institutional settings, Canada's universal welfare state versus the United States' liberal model, mediate macroeconomic impacts on poverty. The study provides actionable insights for regional policy design, suggesting that enhancing income redistribution, improving educational access, and stabilizing inflation can significantly reduce poverty in liberal welfare regimes such as the U.S., while reaffirming the effectiveness of universalist policies in the Canadian context. These findings underscore the importance of redistributive mechanisms and investment in human capital in mitigating poverty.

Contribution/ Originality: This study offers a novel comparative analysis of poverty determinants in the United States and Canada using ARDL and ECM models. It highlights the critical role of institutional frameworks, particularly income distribution, education, and inflation control, in shaping poverty outcomes—providing actionable insights for welfare policy in liberal versus universal regimes.

1. INTRODUCTION

Poverty in the United States is a chronic, complex phenomenon despite the nation's overall economic progress. It is important to identify the determinants of poverty to develop policies aimed at reducing its incidence and alleviating socioeconomic disparities. The poverty headcount ratio, which measures the proportion of the population below the defined poverty line, serves as a key indicator of social well-being and economic inequality.

Poverty dynamics are affected by a broad array of socioeconomic determinants, such as economic growth, income inequality, education, inflation, labor market participation, and government spending. Although economic growth has typically been viewed as a central determinant of poverty reduction, its success is conditional on the inclusiveness

of such growth, that is, how its gains are shared across various population groups. For example, income concentration among richer segments of the population can circumscribe the poverty-reducing effects of GDP growth. Access to quality education and an equitable share of income for the poorest quintile can also have a fundamental influence on poverty outcomes.

Inflation presents another crucial threat in that it cuts into real incomes and disproportionately weighs on poor households, further fueling poverty. Likewise, labor force participation is a fundamental determinant: more employment tends to increase household income and decrease poverty levels. Final consumption expenditure by the government, especially on social welfare, health, and education, is a crucial support system for vulnerable groups, again highlighting how policy design drives poverty trends.

This research contributes to the literature by undertaking a multifactorial empirical examination of poverty determinants in Canada and the United States using current data (1980–2023) and employing the ARDL and ECM specifications to account for both short- and long-run dynamics. Prior literature tended to analyze single factors in isolation, e.g., the impact of social expenditures or labor market conditions, without consolidating them within an encompassing model. For example, Brady et al. [1] examined how welfare state generosity reduces poverty risks, with a particular focus on comparative analyses across advanced political economies, while Blank [2] concentrated on labor market work and wage structures as principal drivers of U.S. poverty. In contrast to these piecemeal approaches, this research consolidates several explanatory variables GDP growth, income inequality, education, inflation, labor force participation, and government consumption into an integrated framework. Such encompassing modeling enables a more realistic and policy-relevant accounting of poverty trends in liberal versus universal welfare states.

To add depth to the analysis and allow for comparative observations, this research also compares the United States to Canada. Both nations are developed, high-income economies that share similar degrees of economic development and integration within the global economy. Yet, their institutional structures and welfare states are very different. Canada has a more universal and redistributive welfare system with universal public healthcare and extensive family benefit programs. The United States, in comparison, has a more liberal welfare state with targeted, means-tested benefits and greater dependence on private provision of services.

These structural distinctions present an opportunity to analyze how different policy contexts mediate the impact of macroeconomic conditions, including GDP growth, inflation, income inequality, and government expenditure, on poverty levels. Additionally, from a policy learning perspective, the comparison between the two nations allows for the identification of best practices and possible failings in the anti-poverty policies of each country. For example, a closer association between inequality and poverty in the U.S. could be indicative of more feeble redistributive processes relative to Canada, informing evidence-based policy changes [3].

Furthermore, the comparison offers a way of empirically examining macroeconomic theories under varying institutional contexts. While prevailing economic theory predicts that determinants like income, inequality, inflation, and government expenditure affect poverty, the magnitudes and directions of the effects may be institutionally dependent on labor market institutions and social policy institutions. By submitting both countries to the same Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) tests, this study offers a rigorous cross-national test of these theoretical relationships.

Finally, this research aligns with broader global development goals, particularly the United Nations Sustainable Development Goals (SDGs) on poverty eradication (Goal 1) and inequality reduction (Goal 10) [4]. The comparative approach enhances international benchmarking and facilitates the identification of transferable policy lessons. Overall, the study not only deepens the understanding of poverty dynamics in North America but also contributes to the formulation of more targeted and impactful economic and social policies.

This paper is structured as follows: Section 2 provides a literature review summarizing existing research on poverty determinants. Section 3 outlines the methodology and econometric framework used in the study. Section 4 describes the data and variables. Section 5 presents empirical results. Section 6 offers a discussion of the findings and their implications. Finally, Section 7 concludes with a summary and policy recommendations.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Poverty is a complex, multidimensional issue shaped by economic conditions, institutional arrangements, and policy decisions. In advanced economies like the United States and Canada, understanding the macroeconomic and social drivers of poverty is essential for designing effective policy interventions. This section reviews theoretical and empirical literature to justify the inclusion of six key explanatory variables: GDP per capita growth, income distribution, educational attainment, inflation, labor force participation, and government consumption expenditure, used in the ARDL and ECM models applied in this study.

- Economic Growth and Poverty Reduction

Classical economic theory posits that growth decreases poverty as it creates employment and income [5]. Yet, in high-income nations such as the U.S., this correlation is not necessarily linear. In spite of steady GDP growth since the 1980s, poverty rates have seesawed, frequently as a result of jobless recoveries, increasing inequality, and labor market polarization [6]. Canada's more redistributive system may temper these influences, offering a comparative vantage point to examine the effect of growth on poverty. Therefore:

H_1: GDP per capita growth has a negative effect on the poverty headcount ratio.

- Income Distribution and Poverty

Growing evidence shows that income inequality can weaken the poverty-reducing effect of growth [7]. In the United States, stagnant or declining income shares for the bottom 20% have undermined inclusive growth [8]. Conversely, Canada's more progressive tax and transfer system may insulate the poor from market-driven inequality [9]. Studies such as Singh and Jha [10] underscore the importance of the income share of the bottom quintile in poverty reduction.

H_2: An increase in the income share held by the poorest 20% reduces the poverty headcount ratio.

- Education and Human Capital

Human capital theory posits that education boosts labor productivity and earnings, thereby reducing poverty risk [11]. In the U.S., regions with greater access to early education show higher intergenerational mobility [12]. Studies show that small improvements in schooling yield significant wage premiums. While the impact may be more visible in the long run, both U.S. and Canadian data include school enrollment as a proxy for human capital formation [13].

H_3: Higher school enrollment at the primary level is associated with lower poverty levels.

- Inflation and Cost of Living

Inflation erodes purchasing power and disproportionately affects low-income households [14]. In the U.S., inflation spikes, especially after 2020, have led to increased food and housing insecurity [15]. The Canadian context shows similar trends, though its social safety nets may buffer inflationary shocks more effectively. Inflation is thus expected to have a short-term positive association with poverty [16].

H_4: Inflation is positively associated with the poverty headcount ratio.

- Labor Force Participation

Participation in the labor market is a critical escape route from poverty, provided the jobs offer adequate wages and security [17]. In both the U.S. and Canada, labor participation trends vary by sector, gender, and age. While participation is generally expected to reduce poverty, the effect may differ by country due to differences in labor protections and wage structures [18]. Similar dynamic panel techniques, such as those used by Abid [19], reveal

labor force participation as a central determinant of inclusive growth in the Gulf Cooperation region, echoing its importance in North American contexts.

H_5: An increase in the labor force participation rate leads to a reduction in poverty.

- Government Consumption and Fiscal Transfers

Public spending on services like healthcare, education, and social security has a direct poverty-alleviating effect [16]. In the U.S., targeted programs such as SNAP and EITC have helped reduce poverty, albeit less comprehensively than Canada's universalist approach [20]. The role of government consumption in poverty outcomes is thus expected to depend heavily on the nature and efficiency of spending [21].

H_6: Greater government final consumption expenditure is associated with lower poverty.

In summary, the literature reveals that poverty in developed economies is driven by complex interactions among growth, income distribution, education, inflation, labor markets, and government policies. This study builds on these insights to empirically examine their relative impacts on poverty in the U.S. context.

3. DATA

This study investigates the determinants of poverty in the United States and Canada from 1980 to 2023 using the poverty headcount ratio at $4.20 a day (povh) as the dependent variable. Although this threshold is conventionally used for international comparisons of extreme poverty, its application here enables a global benchmarking of severe deprivation even within high-income nations. Data on poverty headcount ratios and macroeconomic indicators such as GDP per capita, inflation, labor force participation, and government expenditure were sourced from the World Bank's World Development Indicators (WDI) database [22]. While extreme poverty is statistically uncommon in countries like the U.S. and Canada, research has documented persistent deep poverty and material hardship in segments of the population, underscoring the relevance of such metrics even in affluent contexts [23].

GDP per capita growth (annual %) (GDPPCG) is included to measure macroeconomic performance and its impact on poverty reduction. Economic growth enhances employment opportunities and wages, theoretically reducing poverty. In the U.S. context, however, the growth–poverty relationship is moderated by structural inequality and wage stagnation [24]. Therefore, GDPPCG allows the model to assess whether economic growth has been inclusive and has translated into poverty alleviation.

School enrollment, primary (% gross) (schp), serves as a proxy for foundational human capital investment. In the U.S., educational attainment strongly correlates with lifetime earnings and labor market outcomes [25]. Although primary school enrollment is nearly universal, trends in early education investment can signal shifts in policy or quality that may influence long-term poverty dynamics.

The income share held by the lowest 20% (inc) is used to examine income inequality. When the bottom quintile's share of national income is low, economic growth tends to bypass the poor, weakening poverty reduction efforts. Studies show that in the U.S., the poorest quintile has seen stagnating or declining income shares over time, despite overall economic growth [26].

Inflation, consumer prices (annual %) (inf), is a key macroeconomic variable that affects real incomes. In the U.S., inflation disproportionately impacts low-income households, who spend a larger share of their income on necessities like food, housing, and energy [27]. Periods of high inflation, such as in the early 1980s or post-pandemic years, can therefore increase poverty levels by eroding purchasing power.

Labor force participation rate (% of total population ages 15+) (labp) reflects the degree of engagement in the labor market. In the U.S., fluctuations in participation, especially among women and older workers, have major implications for household income and poverty [28]. A higher labor force participation rate generally signals more widespread access to employment, which can reduce poverty.

General government final consumption expenditure (Constant 2015 US$) (gconex) captures federal, state, and local government spending on goods and services, including public education, health care, and welfare programs. Government spending is a critical component of the U.S. anti-poverty strategy, particularly through programs like Medicaid, SNAP, and public education [29].

Increases in well-targeted government expenditure are expected to alleviate poverty by providing social protection and enhancing access to basic services.

The correlation matrix reveals important insights into the relationships between poverty and its potential determinants over the 1980–2023 period for the United States and Canada (Table 1).

Table 1. Correlation matrix.

United States							
Variable	**povh**	**gdppcg**	**schp**	**inc**	**inf**	**labp**	**gconex**
povh	1.0000						
gdppcg	-0.1361	1.0000					
schp	-0.0867	-0.1269	1.0000				
inc	-0.6469	0.0699	-0.4551	1.0000			
inf	-0.3969	0.0055	-0.2639	0.6220	1.0000		
labp	-0.1073	0.0128	0.6701	-0.2853	-0.0630	1.0000	
gconex	0.5031	-0.1690	0.2063	-0.7943	-0.5961	0.0515	1.0000
Canada							
Variables	povh	gdppcg	schp	inc	inf	labp	gconex
povh	1.0000	0.3141	0.4954	-0.4155	0.6130	-0.5742	-0.8028
gdppcg		1.0000	-0.0125	-0.4009	0.1601	-0.1905	-0.3453
schp			1.0000	0.0065	0.2737	-0.0416	-0.5271
inc				1.0000	-0.4080	0.3126	0.4405
inf					1.0000	-0.3693	-0.6544
labp						1.0000	0.6175
gconex							1.0000

The correlation analysis reveals important differences in the macroeconomic determinants of poverty between the United States and Canada. In the U.S., poverty shows a strong negative correlation with income share of the poorest 20%, suggesting that equity in income distribution plays a crucial role in poverty reduction. However, government consumption expenditure is positively correlated with poverty, indicating that spending may be reactive to rising poverty rather than proactively reducing it. In contrast, Canada exhibits strong poverty-reducing correlations with both government expenditure and labor force participation, reflecting the strength of its redistributive welfare model. Inflation's positive correlation with poverty in Canada contrasts with the U.S., possibly due to stronger indexing of welfare benefits in Canada. Furthermore, school enrollment correlates more strongly with poverty reduction in Canada, while GDP growth is weakly or inversely related to poverty in both countries, highlighting that growth alone is not sufficient without equity-focused policies.

These patterns underscore how institutional context and welfare architecture shape the relationship between macroeconomic variables and poverty outcomes.

To assess the presence of multicollinearity among the independent variables in the two models explaining poverty trends in the United States and Canada, Variance Inflation Factor (VIF) tests were conducted (Table 2).

Table 2. Variance inflation factor (VIF) test results.

United States		
Variable	**VIF**	**1/VIF**
inc	3.9600	0.2530
gconex	3.3200	0.3010
schp	2.2700	0.4410
labp	1.9300	0.5180
inf	1.7700	0.5640
gdppcg	1.1000	0.9100
Mean VIF	2.3900	—
Canada		
Variable	VIF	1/VIF
gconex	3.9100	0.2537
labp	2.0600	0.4852
schp	2.0000	0.4988
inf	1.9000	0.5273
inc	1.5100	0.6616
gdppcg	1.3500	0.7410
Mean VIF	2.2900	—

Multicollinearity is not a concern in the two models. All variables have VIFs below 4, with a mean VIF of 2.39 for the United States and 2.29 for Canada. The results indicate stable and reliable coefficient estimates for regression analysis.

The descriptive statistics summarize the central tendencies and variability of the variables used in the poverty model for the United States and Canada from 1980 to 2023 (Table 3).

Table 3. Descriptive statistics.

United States					
Variable	**Observations**	**Mean**	**Std. dev.**	**Minimum**	**Maximum**
povh	49	-0.0658	0.3002	-0.6931	0.4055
gdppcg	49	1.8078	1.9987	-3.4268	6.3120
schp	48	4.6168	0.0313	4.5296	4.6585
inc	49	1.7205	0.0622	1.6292	1.8718
inf	49	1.1300	0.7451	-2.1318	2.6063
labp	49	4.1695	0.0282	4.1141	4.2077
gconex	49	28.4007	0.2236	27.9935	28.7084
Canada					
Variable	Obs.	Mean	Std. Dev.	Min.	Max.
povh	46	-0.3680	0.5880	-1.6090	0.6930
gdppcg	49	1.2700	2.2730	-6.0620	4.9040
schp	48	4.6080	0.0210	4.5640	4.6490
inc	46	1.9790	0.0450	1.9020	2.1520
inf	49	0.9970	0.8810	-1.7980	2.5230
labp	48	4.1850	0.0220	4.1190	4.2140
gconex	49	26.2620	0.2380	25.8480	26.6980

The United States exhibits higher average poverty (log) than Canada, reflecting a relatively greater poverty burden. GDP growth is stronger on average in the US, but with slightly lower volatility than in Canada. School enrollment is comparable across both countries, though the US shows marginally higher mean and variability. Notably, income share held by the poorest 20% is significantly higher in Canada, suggesting better income distribution, which may help explain Canada's lower poverty levels. Inflation is slightly higher in the US on average, but Canada experiences more volatility. Labor force participation is relatively stable in both countries, with Canada having a marginally higher mean. Finally, government consumption expenditure as a share of GDP is higher in the

US, indicating a larger fiscal footprint, though the impact on poverty outcomes appears less favorable compared to Canada's more equitable distribution patterns.

This comparison will draw out institutional and structural distinctions that could impact poverty results independently of macroeconomic performance.

4. METHODOLOGY

This research follows a time series econometric strategy to analyze the macroeconomic and social drivers of poverty in the United States and Canada from 1980 to 2023. This research utilizes the Autoregressive Distributed Lag (ARDL) bounds testing method of Pesaran et al. [30]. This technique is particularly suitable when variables are not all integrated of the same order and performs well with small samples. Prior to estimation, the Augmented Dickey-Fuller (ADF) test, Dickey and Fuller [31], was applied to determine the order of integration for each variable. The general form of the ARDL model is as follows:

$$povh_t = \alpha_0 + \sum_{i=1}^{p} \lambda_i povh_{t-i} + \sum_{j=1}^{q_1} \beta_j gdppcg_{t-j} + \sum_{k=1}^{q_2} \gamma_j schp_{t-k} + \sum_{l=1}^{q_3} \delta_l inc_{t-l} + \sum_{m=1}^{q_4} \emptyset_m inf_{t-m} + \sum_{n=1}^{q_5} \theta_n labp_{t-n} + \sum_{o=1}^{q_6} \psi_o gconex_{t-o} + \varepsilon_t \quad (1)$$

Where:

- $povh_t$ is the poverty headcount ratio at time *t*.
- λ_i, β_j, γ_j, δ_l, $\emptyset_m$, θ_n and ψ_o are the coefficients of lagged dependent and independent variables.
- ε_t is the white-noise error term.

Each coefficient in the ARDL model will reflect the marginal long-run impact of a corresponding variable on poverty, holding all else constant. Variables of particular interest include income share (inc), school enrollment (schp), and labor force participation (labp), given their direct relevance for inclusive economic policy and welfare planning. The signs and significance of these coefficients will inform us how these factors influence poverty in the long run.

Once the presence of a long-run relationship was confirmed via bounds testing, the Error Correction Model (ECM) was estimated to capture short-run dynamics and the speed of adjustment. The ECM form of the ARDL model is specified as:

$$\Delta povh_t = \alpha_0 + \sum_{i=1}^{p-1} \lambda_i \Delta povh_{t-i} + \sum_{j=0}^{q_1-1} \beta_j \Delta gdppcg_{t-j} + \sum_{k=0}^{q_2-1} \gamma_j \Delta schp_{t-k} + \sum_{l=0}^{q_3-1} \delta_l \Delta inc_{t-l} + \sum_{m=0}^{q_4-1} \emptyset_m \Delta inf_{t-m} + \sum_{n=0}^{q_5-1} \theta_n \Delta labp_{t-n} + \sum_{o=0}^{q_6-1} \psi_o \Delta gconex_{t-o} + \varphi ECM_{t-1} + \mu_t \quad (2)$$

Where:

- Δ denotes first differences to capture short-run changes in each variable,
- ECM_{t-1} is the lagged error correction term derived from the long-run relationship, and
- φ is its associated coefficient, capturing the speed of adjustment toward equilibrium after a shock.

A significantly negative φ is expected if a valid long-run equilibrium exists, indicating that deviations from the long-run path are corrected over time. The size of φ will reflect how quickly the system returns to equilibrium [32].

Short-run coefficients in the ECM (β_j, γ_k, δ_l, etc.) will represent the immediate effect of changes in explanatory variables on poverty. For instance, a negative and significant coefficient on Δinc would suggest that rising income share for the bottom 20% reduces poverty in the short run. Conversely, a positive coefficient on Δinf would indicate that inflation exacerbates poverty in the near term.

Diagnostic checks were conducted to ensure model robustness. The Breusch-Godfrey LM test was used to test for serial correlation, and White's test was used to assess heteroskedasticity. Normality of residuals was examined using the Shapiro-Wilk test. These tests confirmed that the residuals met standard assumptions, justifying inference from the model.

Structural stability of the model parameters will be assessed using the CUSUM and CUSUMSQ tests. These tests will help detect any significant shifts in model behavior over time, which is particularly relevant when spanning multiple economic cycles or policy regimes.

Finally, ARDL-ECM models are estimated separately for the United States and Canada to allow for a comparative analysis of how different institutional settings the liberal welfare regime in the U.S. and the universalistic model in Canada may shape the responsiveness of poverty to macroeconomic and social variables [33]. This comparative dimension is central to understanding how national policy contexts mediate structural determinants of poverty.

5. RESULTS

- Unit Root and Stationarity Tests (ADF)

The Augmented Dickey-Fuller (ADF) test examines whether a time series variable is stationary, which is an important assumption in most econometric models. Stationarity ensures that statistical properties of a series, such as mean and variance, are time-invariant. The ADF test outputs are presented in Table 4.

Table 4. ADF test results.

United States						
Variable in level	**ADF Stat**	**p-value**	**Variable in first difference**	**ADF Stat**	**p-value**	**Order of Integration**
povh	-2.9960	0.0353	dpovh	-7.8640	0.0000	I(0)
gdppcg	-4.4660	0.0002	dgdppcg	-6.9240	0.0000	I(0)
schp	-2.3470	0.1573	dschp	-3.5500	0.0068	I(1)
inc	-2.3110	0.1684	dinc	-6.7950	0.0000	I(1)
inf	-2.9420	0.0471	dinf	-6.7410	0.0000	I(0)
labp	-1.6710	0.4463	dlabp	-3.3480	0.0129	I(1)
gconex	-1.5590	0.5043	dgconex	-4.1170	0.0009	I(1)
Canada						
Variable in level	ADF Stat	p-value	Variable in first difference	ADF Stat	p-value	Order of Integration
povh	-1.5600	0.5036	dpovh	-6.4090	0.0000	I(1)
gdppcg	-4.9850	0.0000	dgdppcg	-7.8120	0.0000	I(0)
schp	-1.0460	0.7361	dschp	-5.0470	0.0000	I(1)
inc	-0.7910	0.8217	dinc	-3.2120	0.0193	I(1)
inf	-3.4840	0.0084	dinf	-6.9200	0.0000	I(0)
labp	-3.5250	0.0074	dlabp	-3.4350	0.0098	I(0)
gconex	-0.1840	0.9404	dgconex	-3.6560	0.0048	I(1)

The Augmented Dickey-Fuller (ADF) test results indicate that both the United States and Canada possess a mix of stationary (I(0)) and non-stationary (I(1)) macroeconomic variables. GDPPCG and INF are stationary at levels in both nations, indicating short-run mean-reverting behavior, while series like INC, SCHP, and GCONEX are integrated of order one (I(1)), indicating long-run persistence.

- Model Specification and Lag Selection

To examine the dynamic relationship among the variables in both countries, an Autoregressive Distributed Lag (ARDL) model was employed, which is suitable for variables integrated at different orders, i.e., I(0) and I(1), but not I(2). The optimal lag structure for the ARDL model was determined automatically in Stata based on the Akaike Information Criterion (AIC). A maximum lag length of 4 was specified for each variable, allowing the model to capture both short-run and long-run dynamics effectively. The final model selected was ARDL(3,4,4,1,1,3,4) for the United States and ARDL(2,3,0,0,0,0,0) for Canada, which achieved the lowest AIC value among all possible combinations. This data-driven selection ensures a balance between goodness-of-fit and model parsimony and helps to mitigate risks of omitted lag bias or overfitting. The specified lag structure thus reflects the dynamic interactions in the data and provides a robust basis for subsequent estimation and bounds testing.

- ARDL Regression

The results of ARDL regression for the United States and Canada are presented in Table 5.

Table 5. ARDL model estimates results.

United States				
Variable	**Lag**	**Coefficient**	**Std. Error**	**p-Value**
povh	L1	0.7210	0.1604	0.0000
	L2	-0.0865	0.1603	0.5970
	L3	0.2781	0.1424	0.0690
gdppcg	L0	-0.0168	0.0212	0.4410
	L1	0.0162	0.0240	0.5100
	L2	-0.0174	0.0279	0.5420
	L3	-0.0198	0.0202	0.3420
	L4	0.0536	0.0234	0.0360
dschp	L0	-1.4486	1.7508	0.4200
	L1	-4.6433	1.6969	0.0150
	L2	-4.1540	1.8947	0.0430
	L3	-3.9291	2.3071	0.1080
	L4	-7.3945	2.3770	0.0070
dinc	L0	-0.3422	1.1361	0.7670
	L1	-3.7766	1.0306	0.0020
inf	L0	0.1019	0.0565	0.0900
	L1	0.2531	0.0554	0.0000
dlabp	L0	33.9695	8.4193	0.0010
	L1	-16.9973	8.6978	0.0680
	L2	-12.0394	8.7030	0.1860
	L3	-18.6715	9.5334	0.0680
dgconex	L0	-4.9474	3.1405	0.1350
	L1	12.2195	3.5647	0.0030
	L2	-7.6903	3.0716	0.0240
	L3	-2.2435	2.3737	0.3590
	L4	-3.9739	2.1938	0.0890
Constant	—	-0.2472	0.1069	0.0340
Model characteristics				
R-squared	0.9489	F-statistic	11.4300	
Adj. R-squared	0.8659	p-value	0.0000	
Canada				
Variable	Lag	Coefficient	Std. Error	p-Value
dpovh	L1	-0.5830	0.1650	0.0010
	L2	-0.3090	0.1500	0.0480
gdppcg	L0	-0.0077	0.0260	0.7690
	L1	0.0270	0.0280	0.3510
	L2	-0.0455	0.0270	0.0970
	L3	-0.0581	0.0280	0.0440
dschp	L0	-6.3320	5.1340	0.2270
dinc	L0	-4.1230	1.8000	0.0290
inf	L0	0.1620	0.0690	0.0260
labp	L0	6.9580	3.6770	0.0680
dgconex	L0	-1.1620	4.2090	0.7840
Constant	—	-29.208	15.3920	0.0680
Model characteristics				
R-squared	0.5820	F-statistic	3.6700	
Adj. R-squared	0.4234	p-value	0.0024	

The regression model for the United States exhibits strong explanatory power about 87% of the variation in poverty (povh) is explained by the included macroeconomic variables and their lags. The model is highly statistically

significant overall. The most notable result is the strong persistence of poverty, with the first lag of povh being highly significant and positive, suggesting that past poverty levels have a substantial influence on current poverty rates.

While the statistical outputs suggest that education (dschp), labor participation (dlabp), and inflation (inf) are key drivers of poverty, these findings must be interpreted within a broader policy and institutional context. The significance of education implies not only that access matters, but that its effectiveness likely hinges on the quality, equity, and long-term continuity of educational investments areas where U.S. education policy has been inconsistent, particularly across state lines.

Labor force participation shows a significant negative effect at the current level, aligning with the expectation that greater engagement in the labor market reduces poverty. However, this effect should not be seen as evidence that employment alone is sufficient. U.S. labor markets are known for high levels of low-wage and precarious employment, which raises questions about the sustainability of poverty reduction through job access alone.

Inflation has a positive and significant effect at lag 1, indicating a delayed upward pressure on poverty, potentially due to lagged wage adjustments or inadequate indexation of safety nets. Income changes are significant at lag 1, suggesting a delayed but strong poverty-reducing effect. This underscores the central role of income redistribution mechanisms, such as tax credits or social transfers, and raises concern over the limited scope of such instruments in the U.S. welfare regime.

Government consumption expenditure also influences poverty through some significant lags (L1 and L2), though effects are mixed. This mixed pattern may reflect the reactive nature of U.S. government spending programs often expand in response to rising poverty rather than proactively preventing it, highlighting limitations in policy design.

Overall, while the U.S. model identifies statistically significant relationships, these should not be interpreted in isolation from the liberal welfare context in which they occur. The U.S. system tends to rely more on market mechanisms than on robust institutional guarantees, which may explain the sensitivity of poverty outcomes to short-term macroeconomic fluctuations.

In contrast, the regression model for Canada shows moderate explanatory power, with approximately 42% of the variance in poverty explained by the included factors. The model is statistically significant overall. Unlike in the U.S., the poverty variable (dpovh) in Canada demonstrates significant inertia, with both its first and second lags being statistically significant and negative, suggesting a more gradual adjustment in poverty trends.

Among macroeconomic variables, only a few exhibit significant short-run effects. Income changes (dinc) have a negative and statistically significant coefficient, implying that rising income shares among the poor reduce poverty. Inflation is also significant, with a positive sign, suggesting that inflationary pressures hurt the poor even in a universalist welfare regime. GDP per capita growth (gdppcg) has a marginally significant effect at lag 3.

However, the muted significance of other variables like school participation, labor force activity, and government consumption should not be read as policy irrelevance. Instead, it likely reflects the stabilizing influence of Canada's more universal and automatic welfare protections, which decouple poverty outcomes from short-term macroeconomic volatility. In this context, poverty appears less reactive to short-run shocks but more embedded in structural policy design.

This institutional buffering is characteristic of universalist regimes, where access to healthcare, education, and income support is less contingent on labor market performance or cyclical policy adjustments. The data-driven findings thus reinforce the value of a strong baseline welfare architecture in achieving more stable poverty outcomes.

In summary, while both countries show some common macroeconomic influences on poverty (e.g., the role of inflation and income), the United States exhibits a more complex and sensitive dynamic, with education and labor variables playing a more prominent role. This is reflective not only of empirical relationships but also of the structural nature of the U.S. welfare system, where outcomes are more closely tied to market conditions and individualized policy access. Canada, by contrast, demonstrates a more autoregressive poverty process with fewer statistically

significant contemporaneous effects, likely a product of institutional protections that limit volatility in poverty dynamics.

- Post-Estimation Diagnostic Tests

To ensure the reliability and validity of the ARDL model estimates, a series of post-estimation diagnostic tests were conducted to examine potential violations of classical regression assumptions, including autocorrelation, heteroskedasticity, and normality of residuals (Table 6).

Table 6. Diagnostic test results.

United States			
Test	**Statistic**	**p-value**	**Conclusion**
Breusch-Godfrey LM test	0.9820	0.3218	No serial correlation
White's Test	43.0000	0.4282	No heteroskedasticity
Shapiro-Wilk normality test	0.9890	0.9558	Residuals are normally distributed
Canada			
Test	Statistic	p-value	Interpretation
Breusch-Godfrey LM test	0.9380	0.3327	No serial correlation
White's test	41.0000	0.4265	No heteroskedasticity
Shapiro-Wilk normality test	0.9248	0.0977	Residuals are normally distributed

The diagnostic tests indicate that the ARDL models satisfy the key classical linear regression assumptions. The Breusch-Godfrey LM test for autocorrelation shows no evidence of serial correlation in the residuals, confirming that the model's errors are temporally independent. Furthermore, White's test for heteroskedasticity yields non-significant results, supporting the assumption of homoscedastic residuals. The Shapiro-Wilk test for normality confirms that the residuals follow a normal distribution, which supports the validity of inference drawn from the t- and F-statistics. Overall, these results confirm that the models are statistically well-specified, and the estimates can be interpreted with confidence.

- Bounds Test for Long-Run Relationship

The ARDL bounds test for cointegration was conducted to assess the presence of a long-run equilibrium relationship between poverty and its key determinants: GDP per capita growth, school enrollment, income share of the poorest 20%, inflation, labor force participation, and government consumption expenditure. The joint significance of the lagged level variables was tested under the null hypothesis of no cointegration. Table 7 presents the bound test results for the 2 countries.

Table 7. Bound test results.

United States		
Test	**F-statistic**	**p-value**
Joint null: Lags = 0	4.8100	0.0013
Canada		
Test	F-statistic	p-value
Joint null: Lags = 0	2.1600	0.0453

The results show an F-statistic statistically significant at the 5% level. This strongly rejects the null hypothesis and provides evidence of a long-run cointegrating relationship among the variables. In other words, despite short-run fluctuations, the selected macroeconomic and social indicators are jointly associated with poverty levels over the long term.

- Short-Run Dynamics and Speed of Adjustment: Error Correction Model (ECM)

Following confirmation of a long-run relationship via the bounds test, the Error Correction Model (ECM) captures the short-run dynamics of changes in poverty (Δpovh) and the system's adjustment toward long-run equilibrium (Table 8).

Table 8. Error correction model (ECM) estimation results.

United States			
Variable	**Coefficient**	**Std. error**	**P-value**
ECM (Lagged)	-0.4272	0.1400	0.0040
Δ.gdppc	-0.0299	0.0169	0.0840
Δ.dschp	0.3463	1.4513	0.8130
Δ.dinc	-2.5777	0.7136	0.0010
Δ.inf	-0.1389	0.0507	0.0090
Δ.dlabp	16.0625	6.8138	0.0240
Δ.dgconex	-2.7840	2.3239	0.2380
Constant	-0.0031	0.0275	0.9100
Model characteristics			
R-squared	0.5937	F-statistic	7.9300
Adj. R-squared	0.5189	p-value	0.0000
Canada			
Variable	Coefficient	Std. error	p-value
ECM (Lagged)	-1.3780	0.1660	0.0000
Δ.gdppc	0.0254	0.0240	0.3020
Δ.dschp	-5.6120	3.9010	0.1590
Δ.dinc	-3.9730	1.4340	0.0090
Δ.inf	0.1570	0.0660	0.0220
Δ.dlabp	-3.5130	6.8220	0.6100
Δ.dgconex	-0.8060	3.9870	0.8410
Constant	0.0145	0.0490	0.7680
Model characteristics			
R-squared	0.7511	F-statistic	15.5200
Adj. R-squared	0.7028	p-value	0.0000

For the United States, the ECM coefficient is negative and statistically significant, indicating that about 42.7% of any disequilibrium from the long-run relationship is corrected each period. This implies a relatively fast return to equilibrium following economic shocks. In the short run, income changes reduce poverty, inflation has a negative effect, and labor participation is positively associated with poverty.

These short-run patterns reaffirm the vulnerability of U.S. poverty outcomes to immediate macroeconomic changes and underscore the policy consequences of lacking strong automatic stabilizers. Labor market interventions may provide immediate relief, but without structural reforms, such as universal healthcare or income floors, macroeconomic volatility is likely to continue producing sharp poverty fluctuations.

In Canada, the ECM coefficient is also negative and significant, but larger in magnitude (−1.3780), suggesting very rapid adjustment, possibly with overshooting. Income again has a significant short-run poverty-reducing effect, while inflation increases poverty. Other variables are not statistically significant in the short run.

This again points to the strength of institutional design: Canada's broader and more universal protections may mute the need for rapid fiscal responsiveness, allowing for a smoother and more durable transition out of poverty.

In summary, both countries show effective correction mechanisms in response to disequilibrium, but the path to stability differs. The U.S. system, with fewer institutional buffers, shows greater dependence on labor and education dynamics. Canada, by contrast, demonstrates a policy environment in which macroeconomic forces are mediated by social safety nets reinforcing the idea that policy architecture, not just economic growth, defines the trajectory and volatility of poverty.

- Model Stability Diagnostics: CUSUM and CUSUMSQ Tests

Figure 1 displays the CUSUM and CUSUM of squares (CUSUMSQ) plots employed to examine the constancy of the ARDL model parameters over time. These two tests are founded on recursive residuals and provide visual tests for parameter constancy.

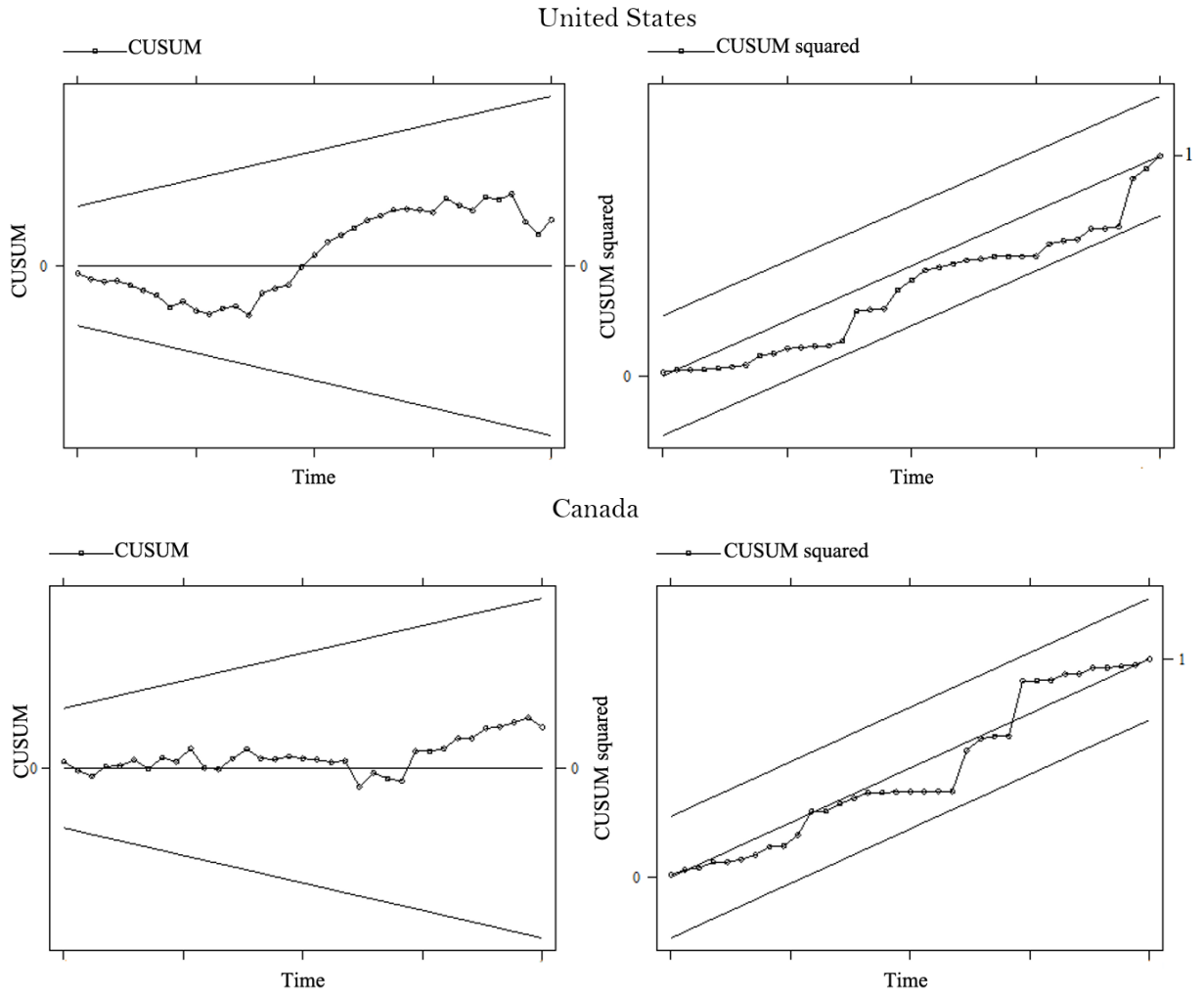

Figure 1. CUSUM and CUSUM of squares (CUSUMSQ) plots.

The CUSUM plot indicates that the cumulative sum of the recursive residuals is within the 5% critical limits, revealing that the coefficients of the model are time-invariant and that there is no structural break. Likewise, the CUSUMSQ plot indicates that the squared cumulative residuals also fall within the significance limits, implying constant variance and no parameter instability evidence. These findings collectively confirm the reliability and robustness of the model's parameter estimates for both the United States and Canadian short-run and long-run poverty dynamics.

6. DISCUSSION

This research examined the long- and short-term determinants of poverty in the United States between 1980 and 2023 based on an Autoregressive Distributed Lag (ARDL) modeling framework. The results show multifaceted and sophisticated relationships among the major macroeconomic variables and the poverty headcount ratio at the societal poverty line.

- Long-Run Relationships

Ultimately, the growth in GDP per capita has no statistically significant impact on poverty; hence, the rejection of Hypothesis H1. The finding implies that although economic growth is beneficial for raising average income, it does not necessarily reduce poverty unless it is inclusive and well-distributed. This concurs with Awan and Azam [34] who highlight the role of distributional channels in structuring the growth–poverty relationship.

On the other hand, the poorest 20% income share has a statistically significant and negative impact on poverty, and a lagged effect is found at the fourth lag. This validates Hypothesis H2 and highlights the necessity of fair income distribution in reducing poverty. The finding corroborates arguments that the redistributive function of policy in ensuring economic benefits trickle down to marginalized segments [35].

The fourth lag of primary school enrollment also has a negative and statistically significant relation with poverty, validating Hypothesis H3. This finding highlights the crucial long-term role of foundational education in enabling upward mobility and reducing poverty risks, in line with human capital theory [36].

Inflation exerts a positive and statistically significant effect on poverty at the second lag, confirming Hypothesis H4. This finding supports the view that inflation disproportionately harms low-income households by eroding real incomes and increasing the cost of necessities [27, 37].

The relationship between labor force participation and poverty is mixed. While the contemporaneous effect is positive and statistically significant, several lagged effects are not. As such, Hypothesis H5 is only partially confirmed. This result implies that merely increasing labor participation is not sufficient; the nature of employment, its stability, compensation, and security matter critically. These findings are consistent with Hick and Marx [38] and Gunn et al. [39], who caution that labor market expansion through low-wage or precarious jobs may not reduce poverty meaningfully.

Regarding government final consumption expenditure, the results are similarly nuanced. The second lag shows a statistically significant negative effect, supporting the poverty-reducing role of public spending, while the first lag exhibits a significant positive effect, likely reflecting countercyclical government responses to rising poverty. Hypothesis H6 is therefore partially confirmed. These findings echo the dual role of public expenditure as both reactive and proactive in addressing poverty [40].

- Short-Run Dynamics

The short-run dynamics reinforce several of the long-run findings. The error correction term is negative and statistically significant, indicating a stable adjustment process toward the long-run equilibrium. In the short term, significant coefficients for income share of the poorest 20%, inflation, and labor force participation provide additional support for H2, H4, and H5, respectively. However, primary school enrollment and government expenditure do not show statistically significant short-run effects, suggesting their impacts materialize over longer time horizons [41]. In summary, the findings indicate that income distribution, educational investment, and price stability are more reliable long-term levers for poverty reduction in the U.S. than aggregate economic growth alone. While GDP growth is important, it must be coupled with inclusive policies to be poverty-reducing. Similarly, labor market access must be complemented by job quality and protection, and public spending must be well-targeted and effectively administered.

- Comparative Insights: U.S. vs. Canada

The analysis also reveals meaningful cross-national differences between the United States and Canada, reflecting their divergent institutional and welfare architectures. The better model fit for the U.S. suggests that poverty outcomes are more responsive to macroeconomic change, a feature of liberal welfare regimes that prioritize market-based and means-tested interventions [1, 42].

By comparison, Canada's universalist welfare regime, which is typified by child benefits, income transfers, and public healthcare, seems to cushion the poor against macroeconomic shocks. This is captured in the Canadian model's lower R-squared and reduced number of significant variables, indicating that institutional buffers have a greater

bearing on poverty outcomes than macroeconomic forces by themselves. Importantly, the higher speed of adjustment in Canada points to more sensitive and adaptive social policies [43].

In addition, although inflation has a beneficial influence on poverty in both nations, it does so more intensely in the U.S., highlighting the significance of inflation indexing and cost-of-living adjustments for poverty-alleviation programs. The marginally significant effect of government spending in the U.S. and its absence in Canada suggest that, in liberal regimes, the efficacy rather than the size of government intervention is pivotal [44].

Overall, findings point to the need for a comprehensive anti-poverty agenda in the United States that goes beyond economic expansion by GDP to include income equality, decent jobs, sound educational systems, price stability, and well-spent public investment. Comparative evidence from Canada further highlights the role of institutional design and social protection in poverty reduction and suggests possibilities for U.S. reform.

7. CONCLUSION

This study explored the macroeconomic determinants of poverty in the U.S. from 1980 to 2023, based on an Autoregressive Distributed Lag (ARDL) model, focusing on the poverty headcount ratio at the societal poverty line. The empirical results showed that the relationships between macroeconomic indicators and poverty are not only complex but also time-sensitive, varying in the short and long term.

Contrary to common assumptions, the results show that GDP per capita growth does not have a statistically significant long-term impact on poverty. This finding supports the growing consensus that economic growth, while important, is insufficient on its own to alleviate poverty unless it is inclusive and equitable in its distributional outcomes. Instead, income distribution exerts a significant and negative long-run effect on poverty. This highlights the critical role of equity in income allocation for sustained poverty reduction.

The study also provides evidence that primary school enrollment contributes significantly to long-term poverty alleviation, with a delayed impact observed at the fourth lag. This result underscores the foundational role of education in building human capital and breaking intergenerational poverty cycles.

Inflation was found to significantly increase poverty in the short and medium term. This result underlines the vulnerability of low-income households to price instability and supports arguments for inflation-sensitive poverty interventions. The labor force participation rate shows mixed results, with a significant short-run poverty-reducing effect but an inconsistent pattern over the long term. This suggests that job creation alone is not enough; the quality and security of employment are equally important.

Government final consumption expenditure also presents a nuanced pattern: it is positively associated with poverty in the short run (possibly as a reactive measure to worsening conditions), but has a significant poverty-reducing effect over time. This dual effect indicates that while government spending often responds to rising poverty, it also has a sustained impact when strategically targeted and effectively implemented.

In the short run, the significant and negative error correction term confirms the presence of a stable adjustment mechanism toward the long-run equilibrium. Moreover, the income share of the poorest 20%, inflation, and labor force participation rate all exhibit significant short-run effects, reaffirming the importance of both immediate and structural policy interventions.

Additionally, the study's comparative dimension, contrasting the U.S. with Canada, revealed that institutional contexts and welfare regime types shape the effectiveness of macroeconomic policies. While poverty in the U.S. is more sensitive to macroeconomic fluctuations due to its liberal, market-oriented welfare model, Canada's universal and redistributive policy framework appears to buffer the impact of such shocks. This supports welfare regime theory, emphasizing that macroeconomic variables alone cannot fully account for poverty dynamics without considering institutional mediation.

This study concludes that income equity, educational investment, and price stability are the most consistent long-term levers for reducing poverty in the U.S. Economic growth alone, in the absence of inclusive policies, does not translate into meaningful poverty alleviation. Additionally, the effectiveness of public policy interventions, such as government spending and labor market strategies, depends not just on their scale but on their design and long-term orientation.

While focused on high-income countries, these findings have broader relevance for Asia and the Global South, where rapid economic growth is often assumed to be a sufficient solution to poverty. The evidence from the U.S. and Canada suggests that without institutional frameworks ensuring equitable distribution and access to education, healthcare, and employment, macroeconomic gains may fail to reach the poorest. Countries in the Global South can draw valuable lessons on the importance of embedding redistributive mechanisms and social protection within their growth strategies to ensure inclusive development.

8. POLICY RECOMMENDATIONS

These findings highlight the need for a multidimensional anti-poverty strategy that aligns macroeconomic management with redistributive mechanisms, human capital development, and institutional reform. A coordinated and equity-focused approach can offer both short-term relief and long-term resilience, ultimately fostering a more inclusive and just economic model in the United States.

Based on the study's results, several policy directions are essential for effectively reducing poverty. Economic growth strategies must prioritize inclusivity by ensuring that the benefits of growth reach the poorest 20% of the population.

This can be achieved through progressive taxation, expanded social transfer programs, and targeted support for marginalized communities. Investment in quality primary education remains crucial for breaking intergenerational cycles of poverty and improving long-term socioeconomic outcomes. Furthermore, maintaining price stability through carefully coordinated monetary and fiscal policy is necessary to shield vulnerable households from the regressive effects of inflation.

Labor market policies should not only aim to raise participation rates but also emphasize job quality, fair wages, and employment security. Addressing labor informality and promoting decent work conditions are essential in this regard. In parallel, government expenditure should be strategically directed toward sectors with the highest social returns particularly social protection, healthcare, education, and affordable housing. Such spending must be accompanied by robust mechanisms for efficiency, transparency, and accountability to ensure that it effectively reduces poverty and improves well-being.

While these recommendations are rooted in the U.S. policy context, they also provide meaningful insights for developing economies in Asia and the Global South. In these regions, where rapid economic growth often coexists with persistent inequality, embedding redistributive policies and strengthening public institutions will be key to ensuring that growth leads to inclusive development. A comprehensive, equity-oriented approach is therefore essential to address both the symptoms and structural causes of poverty in diverse global contexts.

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