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The Impact of Inflation Rate on Income Inequality in Romania

Mihaela SIMIONESCU[1,2]
[1] University of Bucharest, 90 Şoseaua Panduri, 5th district, 050663, Bucharest, Romania.
[2] Academy of Romanian Scientists, 3 Ilfov Street, Bucharest, Romania. ORCID: 0000-0002-6124-2172.
mihaela.simionescu@faa.unibuc.ro

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Abstract: Given the high inflation rate and income inequality in the post-pandemic period, the aim of this paper is to assess on empirical bases the effect of inflation rate on income inequality proxied by Gini index in Romania. The previous studies revealed mixed results related to the effect of inflation on income inequality, but empirical findings are necessary to design the best policies for each country. The inflation rate has significantly increased in the last few years in Romania, but its negative effects do not refer only to economic growth, financial system and foreign direct investment, but also to a social and economic issue like income inequalities. The results of this study based on autoregressive distributed lag (ARDL) models and ANOVA/linear Dependent Dirichlet Process (DDP) mixture model suggest that inflation reduced income inequality in Romania in the period 2000-2023. On the other hand, unemployment and poverty enhanced this issue, while more urban population reduced it in the long-run. The severity of unemployment is a key factor in managing the causal impact of inflation and poverty on Gini index. These empirical findings might help policy-makers to design better policies to tackle more interconnected economic issues to achieve the long-term objectives for sustainable development.

Keywords: inflation; income inequality; Gini index; unemployment; poverty.

Introduction

The macroeconomic policies should ensure high growth and price stability, since generalized increases in prices put pressure on economy and erode the population purchasing power. high inflation can have adverse consequences for a country's economy. Elevated inflation rates can distort economic activity by distorting the relative returns on real and financial assets, thereby hindering export growth (Altunbaş and Thornton, 2022). Additionally, high inflation can discourage investment in productive assets such as equipment and various tools, as it augments the cost of capital (Nasreen et al., 2020). Persistent inflation can impair the efficiency of the financial system, hindering its ability to allocate resources in an efficient way. This can negatively impact financial development and economic growth. Moreover, high inflation can deter foreign direct investment, as it signals economic instability and uncertainty. Furthermore, high inflation can be a symptom of underlying poor monetary rules and unsuitable fiscal policies, which can further exacerbate economic problems (Bittencourt, 2011). Beyond its impact on economic performance, inflation can also exacerbate income inequality, as it disproportionately affects low-income households.

Despite consistent research on the inflation-income inequality nexus, the literature offers conflicting conclusions. Some studies have found a positive association between these indicators, while others have reported a negative or negligible relationship. Furthermore, the magnitude and direction of the estimated effects vary widely across different studies,

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likely due to differences in methodological approaches, data sources, and country-specific factors (Sintos, 2023).

Given this theoretical and empirical background, the main objective of this paper is to assess the impact of inflation on income inequality in Romania in the period 2000-2023. Given the short period, specific econometric techniques are employed to tackle this issue: autoregressive distributed lag (ARDL) model and ANOVA/linear Dependent Dirichlet Process (DDP) mixture model. The selection of these methods is justified by the small period of analysis. The empirical results suggest that inflation reduced income inequality based on Gini index in Romania, but poverty and unemployment enhanced it. These findings are subject to various policy proposals to ensure price stability and lower income inequality.

After this introduction, the paper presents a short literature review to establish main findings in this field of research, while the next sections report data and methodological description, main results and associated discussion. The last part of the paper provides conclusions, highlighting limitations of this study and future directions of research.

Brief literature review

Sintos (2023) outlines existing theoretical frameworks and empirical findings that explore the potential relationship between inflation and income inequality. The existing empirical literature offers mixed results, and theoretical models suggest that inflation can exert both direct and indirect influences on income inequality. Overview of the divergent theoretical predictions regarding the impact of inflation on income inequality are provided by Binder (2019), El Herradi et al. (2022) or Siami-Namini and Hudson (2019).
One direction of research in this area suggests that inflation can exacerbate income inequality. Other studies identify two primary channels through which this occurs. The first is the portfolio channel. If low-income households hold a larger proportion of their wealth in cash relative to their total expenditures, inflation can erode their purchasing power more significantly, leading to increased inequality. The second one is the real wage channel. If salaries, pensions, and social transfers for low-income households are not adequately indexed to inflation, their real income can decline, widening the income gap (Erosa and Ventura, 2002).

The rich tend to hold a more diversified portfolio of assets, including stocks, equities, land, and real estate, which can appreciate in value during inflationary periods. In contrast, the poor primarily rely on wage and pension income, which is often fixed in nominal terms and not easily adjusted to rising prices (Sabir and Aziz, 2018).

Furthermore, low-income households typically hold a larger proportion of their wealth in cash and spend a higher percentage of their income on consumption. As inflation erodes the purchasing power of cash, the financial position of the poor deteriorates relative to the rich. Additionally, high inflation can negatively impact economic growth and job creation, particularly for low-skilled workers. This can lead to a decline in real wages and a worsening income distribution. A substantial part of empirical contribution supports these theoretical predictions, demonstrating a robust positive relationship between inflation and income inequality (Elhini and Hammam, 2021; Afonso and Sequeira, 2022).

The relationship between inflation and income inequality is complex and can be non-linear. Some studies suggest an inverted-U-shaped connection, where inequality initially rises with inflation but then declines at higher levels. Others propose a U-shaped relationship, with inequality increasing at both low and high levels of inflation (Boel, 2018; Binder, 2019).

The effect of price growth on inequality can change depending on various factors, including the source of inflation, the structure of the economy, and the degree of national bank autonomy. For instance, supply-side inflation, driven by rising input costs, may lead to a decline in inequality if it erodes profit margins more than wage income. Additionally, inflation can redistribute income from creditors to debtors, potentially benefiting low-income households with significant debt (Gnangnon, 2020; El Herradi et al., 2022).

Moreover, progressive tax systems can reduce the harmful effects of inflation on inequality by pushing high-income earners into higher tax brackets. However, the effectiveness of this mechanism depends on the responsiveness of tax systems to inflationary pressures (Gustafsson and Johansson, 1999).

Empirical evidence on the relationship between inflation and inequality is mixed. Some studies support a positive association, while others find a negative or non-linear relationship. These discrepancies may be due to differences in methodologies, data, and country-specific factors (Beji, 2019; El Herradi et al., 2022).

Besides inflation, the models include control variables with potential effect on economic growth based on the evidence from previous studies. One important factor affecting income inequality is unemployment. From theoretical point of view, more unemployment translates into more vulnerable people with low income, which might deepen the gap between poor individuals and rich people. There are empirical studies that support this hypothesis. For example, Cysne (2009) has found empirical evidence supporting the notion that rising structural unemployment significantly exacerbates income inequality. He demonstrated how standard job-search models can account for this observed trend. Additionally, the author derived a closed-form general expression for the Gini coefficient of wage-income inequality, given any initial repartition of salary offers. Three numerical examples illustrated the application of this formula.

Poverty is related to unemployment and has also direct impact on income inequality. For example, Atkinson et al. (2010) examined income inequality and poverty within the EU-27. Income, comprising wages, pensions, government transfers, and savings, is a key determinant of household well-being. The authors analyzed income disparities across and within EU countries, with a focus on households identified as "at-risk-of-poverty." This aligns with the EU's social inclusion strategy as part of the Europe 2020 Agenda.

Most of the studies links income inequality with economic growth. In his seminal 1954 address, Simon Kuznets introduced the concept of an "inverted U-curve" of income inequality. By analyzing data from developed countries, he argued that income inequality tends to rise during the early stages of industrialization, but it declines in later stages. Kuznets further highlighted the significant income disparities in developing countries, such as India, Ceylon, and Puerto Rico, compared to advanced economies (Kuznets, 2019). This groundbreaking of his work has shaped subsequent research and discussions on income inequality in developing nations.

Methodology and data

Since the paper evaluates the impact of inflation on income inequality, the study employs Gini index as dependent variable in the regression models and inflation rate based on consumer price index. The control variables refer to GDP per capita, urban population, unemployment rate, and poverty headcount ratio at national poverty lines. The description of the indicators used in this research is made in Table 1.

Table 1. Variables' description

Variable	Notation	Definition	Source of data
Inflation rate (%)	inflation	Inflation is measured based on consumer price index.	International Monetary Fund
GDP per capita (constant 2015 US$)	GDP	It is computed by dividing output to midyear population.	World Bank
Gini index	Gini	The Gini index measures the extent to which wealth or income is unevenly distributed across a population.	World Bank, https://countryeconomy.com/demography/gini-index/romania
Urban population (% of total population)	urban	It represents the percentage of individuals living in cities/towns in total population.	United Nations Population Division
Unemployment rate (% of total labor force) (ILO estimate)	unemployment	It refers to proportion of the workforce constantly searching for employment but unable to find a certain job.	International Labour Organization
Poverty headcount ratio at national poverty lines (% of population)	poverty	It considers the percentage of the population living in poverty as defined by national poverty thresholds.	World Bank

Source: Author's research

Preliminary tests like unit root tests should be employed before establishing the type of econometric model. If the series are integrated of order one or zero, ARDL model could be constructed. The basic ARDL(*p*,*q*) model for two variables is written:

$$Y_t = \alpha + \sum_{i=1}^{p} \beta_i Y_{t-i} + \sum_{j=1}^{q} \gamma_j X_{t-j} + \varepsilon_t \ (1)$$

Y – endogeneous variable;
X – exogeneous variable;
$\alpha, \beta_i, \gamma_j$ – parameters, $i = 1, 2, ..., p$ și $j = 1, 2, ..., q$
$\varepsilon_t \sim iid(0, \sigma)$ – error;
p – lag corresponding to Y;
q – lag corresponding to X.

Considering the equilibrium relationship $Y_t = k + \delta X_t + u$, the long-run effect of X on Y (δ) is given by:

$$\delta = \frac{\sum_{j=1}^{q} \gamma_j}{1 - \sum_{i=1}^{p} \beta_i} \ (2)$$

The causal relationship depending on the unemployment severity might be explained using DDP mixture model. Let us consider the variables $X = ((1, x_i^T))_{nx(p+1)}$ and $y = (y_1, \dots, y_n)^T$. Particularly, i=1,...,n is used as an index for year. For one intercept (1) and p specific covariates, $x = (1, x_1, \dots, x_p)^T$, the coefficients are denoted by $\beta = (\beta_0, \beta_1, \dots, \beta_p)^T$, where β_0 is the intercept while $\beta_1, \dots, \beta_p$ are slopes that correspond to covariates. σ^2 are the errors(ε_i) variance.

The normal distribution for the parameters μ and σ^2 is demoted by $N(\mu,\sigma^2)$. Normal p.d.f. is represented by $n(y|\mu,\sigma^2)=\frac{1}{\sigma\sqrt{2\pi}}\exp\left(-\frac{(y-\mu)^2}{2\sigma^2}\right)$. The likelihood function of y given x with parameters $\vartheta=(\beta,\sigma^2)$ is represented as $f(y_i|x;\vartheta)$.

The non-parametric model is written as:

$f(y|x;\ \vartheta)=\int f(y|x,\tau,\theta)dG_x(\theta)=\sum_{j=1}^{\infty}f(y|x,\tau,\theta_j(x)\omega_j(x)$ (3)
$\{f(.|x,\tau,\theta)\}:(\theta,\tau)\}\in\Theta$ known as kernel densities
$\omega_j(x)$ are varying weights for which the sum equals 1 for $x\in\varkappa$
$\delta_{\theta(x)}(.)$ probability degenerating at $\theta(x)$
τ- parameters outside the mixture
$\{\omega_j(x)\}_j,\{\theta_j(x)\}_j$ infinite groups of specific processes , their index is after $\varkappa$

The Bayesian density regression has the following prior distribution for parameters:
$\vartheta=(\tau,\left(\omega_j(x),\theta_j(x)\right)_j),x\in\ \varkappa$

Let us start from a linear model:

$$y_i=x_i^T\beta+\varepsilon_i,\qquad \varepsilon_i\to N(0,\sigma^2),i=1,2,\dots,n$$

Within this context:
$f(y_i|x_i;\vartheta)=n(y_i|x_i^T\beta,\sigma^2),i=1,2,\dots,n$ *(4)*
OLS estimates are computed as: $\hat{\beta}=(X^TX)^{-1}X^Ty,\hat{\sigma}^2=\frac{1}{n-p-1}\sum_{i=1}^{n}(y_i-x_i^T\hat{\beta})^2$, $y=(y_1,\dots,y_n)^T$ and $X=((1,x_i^T))_{n*(p+1)}$
DDP is considered base for a lot of Bayesian density regressions. DDP prior is written as $G_x{\sim}DDP(\alpha,G_{0x})$. The random distribution is written as $G_x=\sum_{j=1}^{\infty}\omega_j(x)\,\delta_{\theta_j(x)}(.)$. The stick-breaking weights are computed as:

$$\omega_j(x)=v_j(x)\prod_{l=1}^{j-1}\left(1-v_j(x)\right),j=1,2,\dots$$

$$v_j{\sim}Q_j,v_j{:}\,\varkappa\to[01,]$$

$\theta_j(x){\sim}ind\ G_{0x}$ (the atoms)

ANOVA/linear DDP model is based on the following mixing distribution:

$$G{\sim}Stick-Breaking\ \left(\left(a_j,b_j\right)_j,G_0\right)<=>G_X(\theta){\sim}ANOVA-DDP\left(\left(a_j,b_j\right)_j,G_0\right)$$

$$G_x(\theta)=\sum_{j=1}^{\infty}\omega_j(x)\,\delta_{\theta_j(x)}(\theta)$$

$$\theta_j(x)=x^T\beta_j$$

$$\beta_j|\mu$$

$$T{\sim}iid\ G_0=N(\mu,T)$$

Normal kernel $n(y|\theta,\sigma^2)$
In this paper, grouping variable is represented by unemployment categories (higher and lower than 6% unemployment rate).

$$(y_{i(h)})_{i(h)}^{n_h}|X_h{\sim}f(y_h|X_h),h=1,\dots,N_h$$

$$f(y_h|X_h)=\sum_{j=1}^{\infty}\left\{\prod_{i(h)=1}^{n_h}n(y_{i(h)}|x_{i(h)}^T\beta_j,\sigma^2)\right\}\omega_j$$

$$\omega_j = v_j \prod_{l=1}^{j-1} (1 - v_l)$$
$$v_j | \alpha \sim Be(1 - a, b + aj)$$
$$\sigma^2 \sim IG(\frac{a_o}{2}, \frac{a_o}{2})$$
$$\beta_j | \mu, T \sim N(\mu, T)$$
$$\mu, T \sim N(\mu | 0, r_0 I_{p+1}) IW(T | p + 3, s_0 I_{p+1})$$

The main benefits of ARDL models and DDP mixture model are related to the fact that these methods allow us to use small sets of data without any assumption related to normal distribution of data. ANOVA/linear Dependent Dirichlet Process mixture model provides important insights on the significance of causal relationships given the groups that are created. From economic point of view, it is considered that unemployment is an important factor for income inequality and higher or lower values of unemployment rate might control the impact of inflation or poverty on income inequality proxied by Gini index.

Results and discussion

The maxim inflation rate was registered in 2000 (45.66%), but after this year the indicator gradually decreased until a minimum local value of 5.58% in 2009, before the global economic crisis. Given the world financial crisis stared in 2008-2009, the inflation rate in Romania increased to 6.09% in 2010, but after this year a significant decline was observed, with two years of deflation in 2015 (-0.59%) and 2016 (-1.54%). Since 2017, the inflation rate in Romania began to increase, but significant increase was observed in the period 2021-2023 in the pandemic and post-pandemic context, because of the international context with high energy prices and living costs accelerated by the war between Russian Federation and Ukraine. It is important to highlight that Romania was the EU country with the highest inflation in 2023 and more explanations could be brought related to increase budget expenditure without having any coverage in the labour productivity in public sector. Many economists argue that the presidential and parliamentary elections explain the high increase in prices in Romania. On the other hand, Gini index has registered increasing values in Romania since 2000 with lower values in the last few years (2016, 2018-2019), but the pandemic context has exacerbated the income inequality. The highest Gini index was observed in 2006 (39.6). After growth of poverty during the recent global crisis, the indicator has reduced in the last years. Unemployment rate also registered significant variations over the entire period with unemployment rates higher than 7% in 2004-2006, 2011 and 2013. The share of urban population has registered ascending values due to the intensification of urbanization that creates more job opportunities, but one may observed a very slow increase in the last few years (2019-2023) with values a little over 54%. The descriptive statistics associated to the indicators used in the econometric models are displayed in the Appendix 1.

Before constructing the regression models, it is necessary to check for potential presence of unit root in these specific chronological series. According to ADF test, all the time series are stationary in the first difference at 5% significance level, while the series for inflation is stationary in level at the same significance level. Therefore, ARDL models could be constructed.

Table 2. The results of ADF test

Variable	Time series	Equation including:	ADF stat.	Critical value at 5% significance level	Decision
inflation	in level	no trend no intercept	-3.131688	-1.9574	stationary
	in the first difference	no trend no intercept	-3.688509	-1.9583	stationary
	in the second difference	no trend no intercept	-4.284172	-1.9592	stationary
GDP per capita	in level	no trend no intercept	2.694371	-1.9574	non-stationary (I(1))
	in the first difference	no trend no intercept	-1.859024	-1.6242	stationary
	in the second difference	no trend no intercept	-5.495762	-1.9592	stationary
Gini index	in level	no trend no intercept	-2.302468	-3.6330	non-stationary (I(1))
	in the first difference	no trend no intercept	-2.416980	-1.9583	stationary
	in the second diffe-rence	no trend no intercept	-4.067045	-3.6591	stationary
urban population	in level	trend intercept	-1.352054	-1.9583	non-stationary (I(1))
	in the first difference	no trend no intercept	-3.706664	-3.6330	stationary
	in the second difference	no trend no intercept	-5.464430	-1.9592	stationary
unemploy-ment	in level	trend intercept	-2.497319	-3.6330	non-stationary (I(1))
	in the first difference	no trend no intercept	-2.928616	-1.9583	stationary
	in the second difference	no trend no intercept	-3.915881	-1.9592	stationary
poverty headcount ratio	in level	no trend no intercept	-0.819784	-1.9574	non-stationary (I(1))
	in the first difference	no trend no intercept	-2.800679	-1.9583	stationary
	in the second difference	no trend no intercept	-4.048854	-1.9592	stationary

Source: Author's research

According to correlation matrix in Appendix 2, inflation and poverty are strongly correlated with GDP and urban population. On the other hand, GDP is strongly correlated with unemployment and urban population, while unemployment is also correlated with urban population. Therefore, multicollinearity is avoided by not including the correlated variables in the same model. The test proposed by Toda and Yamamoto (1995) for checking causality was applied and the Gini index, which is I(1), is not cause for any explanatory variable, which allows us to construct an ARDL model. Akaike information criterion was used to selected the optimal lags in the ARDL models.
According to Reset test for checking the stability of the parameters, each of the specifications in the case of the four models is correct at 5% significance level, since the p-values associated to the statistics of this test are higher than 0.05. Breusch-Godfrey test was applied to check for errors serial correlation of order one and of order two. For all models, the p-values associated to this text in both versions support the null hypothesis of independent errors (no serial correlated errors) at 5% significance level. White test with cross terms is applied to check for errors homoskedasticity. The p-values for this test are higher than 0.05, so the errors are homoskedastic at 5% significance level. However, the hypothesis of normal distribution of errors is rejected for the first three models at 5% significance level, but it is not rejected for the last model. If the significance level is set up to 1%, the normal distribution of errors is supported for the second and the third model.

Table 3. The results of estimations and diagnostics tests for ARDL models

Variable	**Coefficients (p-values in brackets)**			
	M1	**M2**	**M3**	**M4**
Gini(t-1)	0.617*** (<0.01)	0.699*** (<0.01)	0.792*** (<0.01)	0.773*** (<0.01)
inflation(t)	-0.047** (0.014)	-0.115** (0.026)	-	-
inflation(t-1)	-	-0.128 (0.148)	-	-
unemployment(t)	-	0.397** (0.015)	-	-
poverty(t)	-	0.360** (0.036)	-	-
GDP(t)	-	-	-0.001* (0.092)	-
urban(t)	-	-	-	3.305 (0.227)
urban(t-1)	-	-	-	-4.053** (0.019)
constant	13.872*** (0.0003)	-	8.769** (0.020)	47.978 (0.107)
Regression diagnostics				
Reset test (stat. and p-value in brackets)	1.369 (0.1867)	0.841 (0.411)	1.445 (0.165)	1.034 (0.192)
Breusch-Godfrey test for the first order autocorrelation (stat. and p-value in brackets)	1.930 (0.1807)	0.009 (0.925)	0.122 (0.730)	0.095 (0.760)

Breusch-Godfrey test for the second order autocorrelation (stat. and p-value in brackets)	1.238 (0.313)	0.087 (0.916)	1.133 (0.876)	0.107 (0.898)
White test (stat. and p-value in brackets)	0.113 (0.987)	0.379 (0.945)	1.232 (0.337)	2.009(0.109)
Jarque-Bera test (stat. and p-value in brackets)	21.242 (0.00024)	7.252 (0.026)	7.588 (0.022)	4.785 (0.091)

Source: Author's research

According to Toda-Yamamoto test, Gini index is not cause for any explanatory variables at 1% significance level, but inflation, unemployment, GDP and poverty are causes for income inequality at 1% significance level. However, Table 4 suggests that urban population is not a significant cause for income inequality at 1% significance level.

Table 4. The results of Toda-Yamamoto test for checking causality

Null hypothesis	Chi-square stat.	p-value	Conclusion
Gini index does not cause inflation	10.59632	0.0141	Gini index does not cause inflation at 1% significance level.
Gini index does not cause GDP	3.596597	0.3084	Gini index does not cause inflation at 1% significance level.
Gini index does not cause poverty	4.416621	0.2198	Gini index does not cause inflation at 1% significance level.
Gini index does not cause unemployment	10.66991	0.0137	Gini index does not cause inflation at 1% significance level.
Gini index does not cause urban population	9.428597	0.0241	Gini index does not cause inflation at 1% significance level.
Inflation does not cause Gini index	9.215720	0.0067	Inflation causes Gini index at 1% significance level.
GDP does not cause Gini index	11.57857	0.009	GDP causes Gini index at 1% significance level.
Poverty does not cause Gini index	22.44762	0.0001	Poverty causes Gini index at 1% significance level.
Unemployment does not cause Gini index	14.11759	0.0027	Unemployment causes Gini index at 1% significance level.
Urban population does not cause Gini index	6.467918	0.0909	Urban population does not cause Gini index at 1% significance level.

Source: Author's research

The ANOVA/linear DDP mixture model is used to explain Gini index based on inflation and poverty using severity of unemployment as grouping variable. Prior parameters of model are: $r_0 = 10$, $s_0 = 10$, $a_0 = 5$, a=1 and b=1. We considered two groups: years with unemployment rate higher than 6% and years with unemployment rate lower than 6%. The threshold was selected knowing that the average unemployment is a little over 6%. For more details on methodology, please see Karabatsos and Walker (2012) that made a full description of method. The model is based on 5 000 Monte Carlo samples from 50000 generated samples, excepting 2000 burn in samples. The results of estimations are reported in Table 5. On average, 97.6% of the variation in Gini index is due to unemployment severity. The 75% posterior intervals showed that both inflation and poverty are causes with significant impact on Gini index.

Table 5. Dirichlet process mixture of linear regressions model- Posterior Summary Estimates for explaining Gini index according to unemployment severity (high unemployment/low unemployment)

Parameter	Mean	Standard deviation	25%	75%	CUSUM
$\beta_0(sample)$	18.977	13.017	10.849	27.065	0.344
$\beta(sample): inflation$	-0.115	2.165	-0.23	-0.17	0.384
$\beta(sample): poverty$	0.309	2.046	0.381	0.451	0.337
σ^2_{sample}	2.161	1.358	1.424	2.744	0.317
μ_{β_0}	3.273	3.387	1.042	5.540	0.500
$\mu_{inflation}$	-0.042	2.998	-2.034	1.907	0.370
$\mu_{poverty}$	0.116	2.946	-1.842	2.118	0.378
τ_{β_0}	141.683	152.344	67.517	163.762	0.493
$\tau_{\beta_0:inflation}$	-1.211	25.841	-10.213	8.301	0.356
$\tau_{\beta_0:\,\beta_{poverty}}$	1.697	27.299	-7.890	10.396	0.381
$\tau_{\beta_{inflation}}$	4.708	5.671	1.844	5.350	0.479
$\tau_{\beta_{inflation}:\beta_{poverty}}$	-0.063	3.705	-1.062	1.000	0.473
$\tau_{\beta_{poverty}}$	4.678	6.463	1.836	5.325	0.487
α	2.113	2.237	0.592	2.878	0.488
$\beta_0(unemployment < 6\%)$	26.650	1.342	26.361	27.227	0.015
$\beta_0(unemployment > 6\%)$	26.740	0.620	26.372	27.232	0.014
$\beta_{inflation}(unemployment < 6\%)$	-0.199	0.041	-0.218	-0.184	0.270
$\beta_{inflation}(unemployment > 6\%)$	-0.202	0.027	-0.219	-0.184	0.273
$\beta_{poverty}(unemployment < 6\%)$	0.421	0.056	0.396	0.437	0.136
$\beta_{poverty}(unemployment > 6\%)$	0.418	0.031	0.396	0.437	0.136
$s^2(unemployment < 6\%)$	2.429	0.731	1.848	2.952	0.035
$s^2(unemployment > 6\%)$	2.444	0.731	1.854	2.963	0.031
ICC (intraclass correlation)	0.976	0.021	0.969	0.990	0.462
Reliability (β_{R_0})	0.998	0.002	0.997	0.999	0.462

Reliability ($\beta_{R_{inflation}}$)	0.933	0.055	0.910	0.973	0.476
Reliability ($\beta_{R_{poverty}}$)	0.933	0.787	0.994	0.003	8.349
$\beta_{s^2}(acceptance\ rate)$	0.234	0.422	0.000	0.000	0.000

Source: Author's research with Matlab.

Given the research findings that unemployment severity, inflation, and poverty significantly impact the Gini index, several policy proposals can be considered to mitigate income inequality. Government should implement policies that balance worker protection with flexibility to adapt to changing economic conditions. It is necessary to strengthen social safety nets, including unemployment benefits, to protect vulnerable populations during economic downturns. Poverty reduction should be also a priority for Romanian policy-makers that should provide targeted cash transfers to low-income families, conditional on meeting specific requirements like education and healthcare.

The results suggest that inflation reduces income inequality. Inflation can erode the value of wealth held in assets like cash or savings accounts. This can disproportionately affect wealthier individuals who tend to hold a larger portion of their wealth in these forms. As a result, the wealth gap between the rich and poor may narrow. Inflation can reduce the real value of debt, benefiting debtors, who are often lower-income individuals. This can help to alleviate financial burdens and improve their economic situation. More economic growth reduces income inequality, but the impact is very low. The urban population in the previous period reduced income inequality, because cities offer better job opportunities with higher wages.

These findings are contrary to those highlighted by Barro (2013) who particularly showed that higher inflation rates, mostly in developing countries, are linked to increased income inequality. This is because inflation can significantly reduce the purchasing power of the poor, who often rely on fixed incomes or informal employment. On the other hand, Aghion et al. (2006) also highlight the negative impact of inflation on the poor, especially in developing economies with large informal sectors, where wage adjustments may be slow. According to Destek et al. (2020), inflation in Turkey between 1990 and 2015 had a complex impact on income inequality. While it increased inequality in the short run, it had the opposite effect in the long run. This might suggest that a non-linear relationship might be checked for Romania.

Since inflation, unemployment, GDP and poverty are long-run causes for income inequality, the policies that tackles inflation, unemployment, low economic growth and poverty should be also beneficial for reducing the gaps between richer and poorer people.

Conclusions

The previous studies provided mixed results related to the impact of inflation on income inequality on specific countries or on group of countries. This study tackles the issue for a single country, Romania. The empirical findings based on quantitative methods (ARDL models and ANOVA/linear DDP mixture model) for a short period (2000-2023) indicated that inflation reduced income inequality measured by Gini index. On the other hand, unemployment and poverty enhanced the income inequality, the severity of unemployment being a critical issue. The economic growth has a very small impact on income inequality, while more urban population reduced Gini index in the long-run.

Besides the utility of this results for policy-makers, the paper is still subject to limitations. The period of analysis is short, because of limited data availability. On the other hand, only few control variables were included in the regressions and only one country was analysed. Given these limitations, the future directions of research should take into account more control variables and more countries in the sample. A comparative analysis between Romania and other Eastern European countries would be relevant in this case to share the best practices in tackling income inequality. It is also necessary to use other indicators to proxy income inequality and to consider also the wealth inequalities.

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Appendix 1

Variable	GINI INDEX	INFLATION	GDP	POVERTY	UNEMPLOYMENT	URBAN
Mean	34.75000	9.311601	8388.489	23.62500	6.342375	53.70250
Median	35.55000	5.688337	8260.777	23.60000	6.798000	53.89350
Maximum	39.60000	45.66659	12386.46	26.40000	8.112000	54.67200
Minimum	29.00000	-1.544797	4567.240	20.80000	3.912000	52.78000
Std. Dev.	2.467704	11.00638	2325.995	1.579832	1.070625	0.529637
Skewness	-0.774779	2.067024	0.087786	-0.247325	-0.696497	-0.246191
Kurtosis	3.465241	6.860576	2.026294	2.004643	2.780431	2.133923
Jarque-Bera	2.617577	31.99439	0.978929	1.235415	1.988644	0.992530
Probability	0.270147	0.000000	0.612955	0.539179	0.369974	0.608800
Sum	834.0000	223.4784	201323.7	567.0000	152.2170	1288.860
Sum Sq. Dev.	140.0600	2786.231	1.24E+08	57.40500	26.36348	6.451846
Observations	24	24	24	24	24	24

Appendix 2

INFLATION	1.000000	-0.585733	-0.806263	-0.591026	0.302267	0.392068
GDP	-0.585733	1.000000	0.338333	0.945683	-0.769005	-0.712466
GINI	-0.806263	0.338333	1.000000	0.391877	-0.121602	-0.248587
URBAN	-0.591026	0.945683	0.391877	1.000000	-0.615161	-0.716089
UNEMPLOY-MENT	0.302267	-0.769005	-0.121602	-0.615161	1.000000	0.448604
POVERTY	0.392068	-0.712466	-0.248587	-0.716089	0.448604	1.000000

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